

clico: 14 CASE STUDIES

INSECURITY IN THE 'PEARL OF THE MEDITERRANEAN': ALEXANDRIA

WHAT CHARACTERISTICS MAKE THIS AREA PARTICULARLY RIPE FOR STUDY?

The Nile delta and therefore the city of Alexandria is considered to be amongst the five most affected coastal zones in the world from a 1m Sea Level Rise (SLR). It is one of the most densely populated deltas with a limited evasion capacity to mitigate the impacts of SLR due to its location in the desert.

WHAT IS THE ONE MOST IMPORTANT MESSAGE YOUR RESEARCH HAS FOR A BROADER AUDIENCE?

Large-scale relocation due to SLR might become inevitable in many coastal zones in the future, bearing tremendous security risks if not properly managed. For example, large-scale relocation due to SLR might

become inevitable in many coastal zones in the future bearing tremendous security risks.

HOW DOES THE SITE FIT INTO THE WIDER CLICO PROJECT?

The case study explores a worst case scenario for human insecurity, in which government-driven relocation programmes to adapt to SLR might not fit the livelihood demands of vulnerable groups. Thus, it explores the security risks (displacement and livelihood deprivation of social groups) and the main drivers that are likely to emerge from improper adaptation.

CAN YOUR ANALYSES BE EXTRAPOLATED TO COMPARABLE REGIONS?

Many other coastal zones are facing similar problems,

due to SLR and the intensification of exposure in coastal zones. If resettlement presents the only adaptation option, the framework and the methodology applied in this case study can be transferred to other regions. However, research and methods need to be adapted to fit their specific characteristics.

WHAT ARE THE BROADER SOCIAL OR POLICY IMPLICATIONS OF YOUR FINDINGS?

Large-scale relocation in response to SLR requires much more attention in the international policy arena on climate change adaptation. It is very important to support countries and regions in developing well-in-advance, people-centred and incentive-based relocation policies and to facilitate mainstreaming them into today's relevant sector policies and urban master plans.

SUMMARY



Hundreds of thousands of people in Greater Alexandria will inevitably need to relocate and find different means of earning a living as a direct result of climate change, and the new Egyptian Government needs to find win/win strategies for transition.

EMERGING RISKS: SEA LEVEL RISE AND POTENTIALLY FORCED AND PLANNED RELOCATION

The Arab Spring revolution followed decades of kleptocratic rule in Egypt, a culmination of long-term economic depression and friction between the socially- and economically-disadvantaged majority and the privileged private-political elites. Founded by Alexander the Great over 2,000 years ago,

Alexandria is an important industrial centre and port with a population of more than 4 million. The city has experienced intermittent inundations from the sea over centuries – much of its area, especially in the hinterland, is below sea level. If its rapid and uncontrolled expansion since the 1960s continues, by 2060 its hinterland will be fully urbanised.

VULNERABLE PEOPLE

Until recently, the notion of relocating people from the city was disregarded by the Government, but climate change is expected to raise sea levels in the Mediterranean between 30 cm and >1 m this century; a 1 m rise would make about 10 per cent of Alexandria's population homeless, mainly fishermen and farmers on the north-eastern coast around Abu Quir Bay and low-income tradesmen and workers in Alexandria's eastern fringes.

The fishermen and farmers, despite comparably little education, have a high degree of climate change awareness, and so may be amenable to relocation programmes. However, their livelihoods are at stake. The city dwellers have few resources and if nothing is

done, given future expansion projections many more people like them will be at risk.

RELOCATION POLICIES DESERVE GREATER ATTENTION IN THE INTERNATIONAL POLICY ARENA AND IN EGYPT

To avoid disaster, the challenges of large-scale forced and planned relocation and human security risks need to be addressed today. Policies that improve living conditions now and ensure security in the future, such as liberalising the housing market to create easier access and assisting people in flood risk areas to find alternative employment, would create a win/win situation, but corruption-free governance is a prerequisite for this to take root.

CONTACT

Niklas Gebert
Research Associate,
United Nations University
Institute for Environment and Human Security
(UNU-EHS)

T +49 228 815 0244

E gebert@ehs.unu.edu

COOPERATION IN THE SPANISH/ MOROCCAN BIOSPHERE: ANDALUSIA



WHAT CHARACTERISTICS MAKE THIS AREA PARTICULARLY RIPE FOR STUDY?

The Intercontinental Biosphere Reserve of the Mediterranean (IBRM), located between Spain (Europe) and Morocco (Africa), is an interesting pilot site to assess the current and expected

environmental vulnerabilities to climate change in this area shared by two different countries. Moreover, it enables the assessment of the Biosphere Reserve figure as a tool to manage climate change adaptation in this region.

HOW DOES THE SITE FIT INTO THE WIDER CLICO PROJECT?

This case study contributes to CLICO through three key singularities: a) it is a unique Biosphere Reserve; b) it is shared by two socially and politically contrasted countries; c) the work is specially focused on hydro-ecological impacts of drought underlying social vulnerabilities.

HAS THE SITE THROWN UP ANY LOGISTICAL

OR POLITICAL CHALLENGES?

The recent creation of the Intercontinental Reserve of the Mediterranean (2006) with a shared management board between Spain and Morocco makes it challenging to jointly develop a cooperative adaptation strategy for the area, overcoming political, cultural and socioeconomic barriers.

WHAT IS THE ONE MOST IMPORTANT MESSAGE YOUR RESEARCH HAS FOR A BROADER AUDIENCE?

The Mediterranean region might become one of the most vulnerable areas in the world regarding climate change, specially related to water availability (stream flow reduction, changes in forest and crop suitability, and water uses).

SUMMARY

Climate change will intensify already mounting pressures on water resources from population growth, intensive agriculture, economic development and tourism on the Mediterranean coastline.

WATER VULNERABILITY TO CLIMATE CHANGE IN THE INTERCONTINENTAL BIOSPHERE RESERVE OF THE MEDITERRANEAN

The Intercontinental Biosphere Reserve of the Mediterranean (IBRM), created in 2006, spans a million hectares on the western side of the Mediterranean. In an effort to preserve the region's natural and cultural diversity, it brings together Morocco and Spain, two countries with very different politics and institutions. More than 556,000 people live within its limits with nearly another 163,000 in bordering towns, and the IBRM is a main source of water for these neighbouring areas.

EFFECTS OF CLIMATE CHANGE

Projections for the area indicate increasing temperatures and substantially decreasing rainfall, with the likelihood of water scarcities and drought, and the possibility of conflicts among users.

On the Moroccan side, the population is mainly dependent on traditional agriculture, forestry and farming and is therefore very vulnerable to climate changes. Furthermore, migration from rural areas to nearby cities and tourism has resulted in an increasing demand for water in areas adjacent to the IBRM. On the Spanish side, water conflicts have arisen between the Reserve's rural areas and tourism on the coast.

INSTITUTIONAL COOPERATION

There is weak cooperation among institutions and fragmented roles for state and regional administration and water authorities, often resulting in conflicts which slow down implementation of legislation. However, partnerships between Spain and Morocco for stability, security and sustainable development have grown. Both the Andalusia region and Spain have established cooperation programmes where Morocco is a main beneficiary and the countries are preparing a common water management framework.

THE WAY FORWARD

Improving the management of natural and forest areas and infrastructures, involving the public in designating co-responsibility for water management, establishing monitoring networks, promoting low-consumption irrigation systems and the use of alternative water sources, planting drought-resistant crops, and reinvesting water sector profits in conservation and protection of natural resources would ensure a future for the IBRM. The first step on the long road to such success, however, must be enforcement of current laws and strengthening of common institutions.

CONTACT

Diana Pasqual
Tècnic Centre de Recerca Ecològica i
Aplicacions Forestals (CREAF)

T +34 93 581 46 75
E d.pasqual@creaf.uab.cat

Eduard Pla
Tècnic Centre de Recerca Ecològica i
Aplicacions Forestals (CREAF)

T +34 93 581 46 75
E eduard.pla@uab.cat

A QUESTION OF CITIZENSHIP: THE EBRO DELTA

WHAT CHARACTERISTICS MAKE THIS AREA PARTICULARLY RIPE FOR STUDY?

The Catalan Office for Climate Change considers the Ebro Delta as one of the two sites in Catalonia that are clearly vulnerable to climate change. A sea-level increase between 0.4-1m by the end of the century would involve the disappearance of at least half of the Delta if measures are not taken.

TO WHAT EXTENT HAVE YOUR FINDINGS BEEN IN LINE WITH EXPECTATIONS?

The study has corroborated expectations that climate insecurity is shaped by an interplay of socio-political, economic, and hydro-climatic factors. Nevertheless, study findings revealed

that security concerns have a citizenship dimension, specifically that insecurity to climate change raises concerns as to whether the state complies with its duties towards citizens and that everyday citizen practices try to address state inaction to address lack of security. Such citizenship dimensions have previously received little attention in the literature, and the study has thus raised issues that warrant further exploration.

WHAT IS THE ONE MOST IMPORTANT MESSAGE YOUR RESEARCH HAS FOR A BROADER AUDIENCE?

Formal (eg. state) and informal (eg. civil society) attempts to deal with security implications of

climate change bring citizenship issues to the fore. They raise concerns about the real limits of citizen rights and if the state complies with its duties towards citizens.

WHAT ARE THE BROADER SOCIAL OR POLICY IMPLICATIONS OF YOUR FINDINGS?

Policy makers should consider how adaptation measures impact upon citizenship issues if such interventions are to be effective and legitimate. This can be achieved through decision-making processes that take into account ways in which adaptation measures may degrade citizenship and by being prepared to modify or adjust adaptation plans if necessary.

SUMMARY



Analysis of milestones in water management in the Ebro Delta over the last three decades reveals interactions of both conflict and cooperation. An attempt to dry up one of the last lagoons of high ecological value met with popular opposition which was the catalyst for the creation of a nature reserve.

A VALUES-BASED APPROACH TO VULNERABILITY AND ADAPTATION TO CLIMATE CHANGE IN THE EBRO DELTA

The Ebro River flows into the Mediterranean in the Spanish region of Catalonia. Sediment

deposited at the mouth over centuries has created a wetland of 320 km², part of which is the natural reserve. Some land was drained for agriculture many years ago, being planted with rice, vegetables and fruit trees. Rice farming was bolstered in the 19th Century and intensified in the 20th.

VULNERABLE COMMUNITIES

As a result of climate change, the Delta faces a rise in the level of the Mediterranean Sea, which would erode the current coastline and render land unviable for farming. It also faces drought from rising temperatures and lower rainfall and has experienced flooding in the past. The Delta populations most at risk from climate change effects are the farming sector, the fish and shellfish sector in the bays, and also urbanised centres which are mostly residential and tourist areas.

REPRESENTATION FOR DIFFERING PERSPECTIVES

The region is managed in an uncoordinated fashion by the national administration and multiple

water management stakeholders with divergent interests. Lack of infrastructure has prompted a strong perception by locals that their needs are ignored. Conflicts of interest have emerged on issues surrounding the environmental flows of the river. Neglect of consultation, representation and communication has led locals to question imbalances of power in these arrangements and to growing mistrust. The locals do, however, view European institutions positively because of their involvement with environmental policy in the area.

To gain trust and enhance security, water transfer issues should be incorporated into adaptation measures, but more dialogue is needed. The environmental flows of the Ebro, including its final stretch, also need to be specified.

CONTACT

Christos Zografos
CLICO and Ebro Delta case study
Research Coordinator

T +34 93 1650 124
E christos.zografos@uab.cat

SETTING PEOPLE IN VILLAGES MIGHT INCREASE THEIR VULNERABILITY: LESSONS FROM GAMBELLA, ETHIOPIA

WHAT CHARACTERISTICS MAKE THIS AREA PARTICULARLY RIPE FOR STUDY?

Gambella, Ethiopia is highly vulnerable to the impacts of future climate change. The population depends upon traditional livelihoods that are very reliant on ecosystems and climatic conditions. Regular flooding and erratic rainfall already lead to food insecurity. Exacerbating these conditions are tense socio-political relations between and within ethnic groups that have led to a history of violence in the region.

CAN YOUR ANALYSES BE EXTRAPOLATED TO COMPARABLE REGIONS?

Although the specific details are highly tied to the context of Gambella, the findings can be

generalised to comparable regions. In highly vulnerable regions, it is unlikely any adaptation response could simultaneously address all hazards posed by climate change. Thus any policy-making decision inherently entails a prioritisation of which threats to address and a vision for the best mechanism for doing so.

WHAT ARE THE MOST IMPORTANT MESSAGES YOUR RESEARCH HAS FOR A BROADER AUDIENCE?

Firstly, that adaptation decisions are not purely scientific, rather they are embedded in broader socio-political contexts and thus serve to promote specific agendas; in Gambella, actions designed to reduce vulnerability to climate change

simultaneously serve to progress development plans for the region. Secondly, the impacts of climate change are multi-faceted, and actions may have unintended consequences that reduce response capacity to another aspect of climate change, as demonstrated in Gambella, where actions designed to reduce flood threats reduce capacities to deal with erratic precipitation.



SUMMARY

Politics focused on adaptation in Gambella has differential impacts on human security.

CLIMATE ADAPTATION IN HIGHLY VULNERABLE REGIONS: THE POLITICS OF HUMAN SECURITY IN GAMBELLA, ETHIOPIA

Of five indigenous groups and one settler population in the Gambella region, the Anyuae and the Nuer are the most populous and politically dominant. The arrival of new settlers and refugees, as well as domestic and newly-emerging international agricultural investments, has led to tensions within and between ethnic groups over land ownership and resource allocations, which are proportionately distributed.

The indigenous groups of Gambella rely primarily on natural resources for their livelihoods but lack of infrastructure, a history of political instability and poverty are such that major resources are currently unexploited. Two main government policies for Villagisation and Agricultural Development-Led Industrialisation aim to change

this, but are perceived as giving preference to the Anyuae and the Nuer. Putative petroleum fields and the region's large potential for hydro-power would further complicate land allocations. Local and non-governmental organisations have lobbied the government to develop a land use plan, without much result. Setting official borders between ethnic groups is problematic.

THE GEOGRAPHY OF VULNERABILITY

Ethiopia experiences highly variable rainfall within 20-year cycles. Predictions for rainfall vary, but the Gambella region is likely to see temperatures rise over this century. Increased flooding or drought may further intensify competition and strengthen existing conflicts. While no ethnic group is more at risk than another, the region's remoteness, poor road systems, floods and droughts make geography a determinant of vulnerability. Dispersed settlements and those closer to the border with Sudan are vulnerable to cattle raids. Women, children and the elderly are most vulnerable, at risk of being captured as prisoners

of war, held hostage, or subject to other abuses and violence.

DISTRIBUTION OF POWER

Monitoring compliance with policies and measures to address the root causes of conflict, such as poverty and mistrust, are much needed. The issue of authority also needs urgent attention: the Villagisation programme in Ethiopia, with plans to resettle communities to make way for large agricultural investments, raises the question of who and what is prioritised and how such decisions are taken. Moreover, any region characterised with complex socio-political relations fraught with tension over land and water use will likely face similar challenges in dealing with climate change.

CONTACT

Anita Milman
Assistant Professor Department of
Environmental Conservation
University of Massachusetts at Amherst

T +1 413 545 3729

E admilman@cal.berkeley.edu

CLIMATE VARIABILITY IS NOT A CAUSE OF DOMESTIC WATER CONFLICT: LARGE N-STATISTICAL STUDY

WHAT ARE THE OVERRIDING AIMS OF THE LARGE N STUDY?

Our project essentially focused on all countries of the CLICO area, thus trying to reach full coverage and a maximum of generalisability. That being said, our team also conducted a series of case studies that primarily focused on those countries that appeared as 'outliers' in the quantitative analysis, i.e. those countries that were particularly cooperative or conflictive over water resources.

TO WHAT EXTENT HAVE YOUR FINDINGS BEEN IN LINE WITH EXPECTATIONS?

Originally, one might have expected that environmental factors such as climate variability in the form of temperature and precipitation changes

are likely to matter most for water-related conflict or cooperation. However, it turned out that these influences are actually of minor importance and that socioeconomic variables or regime type are more important.

CAN YOUR ANALYSES BE EXTRAPOLATED TO COMPARABLE REGIONS?

Despite the specific geographical focus of each strand of the CLICO project, we believe that our analysis and the corresponding findings could well be extrapolated to comparable regions

WHAT IS THE ONE MOST IMPORTANT MESSAGE YOUR RESEARCH HAS FOR A BROADER AUDIENCE?

Climatic factors do not influence conflict over water resources. This rejects the frequently stated claim of 'water-wars' at least in our setup over domestic water events.

WHAT ARE THE BROADER SOCIAL OR POLICY IMPLICATIONS OF YOUR FINDINGS?

The empirical analysis offered evidence that both demand factors (primarily, economic development) and institutional restraint (primarily, democracy) influence domestic water interaction. This speaks to the broader debate on climate security and appears to substantiate other research that fails to connect climate variability to more severe forms of armed conflict.

SUMMARY



Extraction and analysis of 10,352 cases of domestic water conflict and cooperation events from 80,000 media items obtained for 35 countries in the Mediterranean, Middle East and Sabel for the period 1997 to 2009 shows that there was more cooperation than conflict in the region, indicating that conflicts over water resources in the region are unlikely in the foreseeable future.

DEMAND, SUPPLY, AND RESTRAINT: DETERMINANTS OF DOMESTIC WATER CONFLICT AND COOPERATION

The Water Conflicts and Cooperation Database constructed in the study now provides a baseline for

understanding the full spectrum of interactions on water as climate change effects occur. It holds time series data and provides geographic information so that it is possible to analyse spatial patterns and dynamics of cases and other features such as settlement arrangements, local weather conditions and patterns, waterways and irrigation channels, topographies and land usage designations. It thus provides a solid basis for future in-depth qualitative research. Its utility depends naturally on the quality of its data: an event may not have received media attention, or may have been suppressed or misrepresented. The database has therefore been verified against known circumstances in two countries.

ROOT CAUSES OF INTERACTIONS OVER WATER

The study found that climatic factors were not significant drivers of conflict, but that institutional factors clearly were. Demand for water from economic development and, to a smaller degree, agricultural productivity and population density, increase the risk of conflict over water. Institutional

restraint, in the shape of higher levels of democracy, increases the risk of conflict over water and, to a smaller degree, political stability increases the probability of cooperation. However, while democratic and more economically developed countries make room for higher frequencies of conflicts, they also have means of keeping the intensity of conflicts low.

The study found no evidence that variations in water supply in terms of precipitation levels and temperature patterns account for the dynamics of either conflict or cooperation. Interactions are rather shaped by opportunity, and restraints are determined by the qualities of societies themselves, not by nature. This finding substantiates other research that fails to connect climate variability to serious conflict.

CONTACT

Thomas Bernauer
Professur für Internationale Beziehungen
(Politikwissenschaft)
ETH Zürich

T +41 44 632 63 85
E thbe0520@ethz.ch

THE UNFORTUNATE LEGACY OF THE NEW SUDANS



WHAT ARE THE OVERRIDING AIMS OF THE LARGE N STUDY?

Sudan (including the newly independent state of South Sudan) has long served as the textbook case for debates around the relations between water stresses, climate change and violent conflict.

HAS THE SITE THROWN UP ANY LOGISTICAL OR POLITICAL CHALLENGES?

Due to the recent separation, the legacy of conflict and new conflicts in the border areas, socio-political relations in both Sudans remain fragile. This led to some restrictions due to security concerns in South Sudan, and to a regrettable lack of access to North Sudan.

TO WHAT EXTENT HAVE YOUR FINDINGS BEEN IN LINE WITH EXPECTATIONS?

Contrary to the conventional wisdom about environmental scarcity, water scarcity and climate change leading to violent conflict, we found a multiplicity of complex conflict dynamics not reducible, and sometimes not

even related, to environmental issues. We found that it was not water scarcity, but relative water abundance, and the development of relatively abundant water resources, which has been most closely associated with conflict in Sudan. Moreover, we found that state strategies of accumulation and dispossession, rather than any absence or weakness of state control, have been key factors in these processes. Nonetheless, we did encounter a widespread conventional wisdom about scarcity-related conflict dynamics informing local, national as well as international policy making. But while climate change may contribute to such conflicts, they will always be primarily determined by political as opposed to environmental changes.

SUMMARY

While the Darfur conflict is often cited as one of the original 'climate conflicts', it is the legacy of a long history of almost continuous violence that drives vulnerability to climate change in Sudan, hampering social and economic development and contributing to continued dependency on humanitarian aid.

BEYOND 'SCARCITY', 'STATE FAILURE' AND 'UNDER-DEVELOPMENT': RETHINKING WATER, CLIMATE CHANGE AND CONFLICT IN THE NEW SUDANS

With a largely arid climate, the Sudan region is prone to frequent droughts and floods. Annual rainfall is declining, and currently ranges from almost zero in the north to about 90 mm in the south. Renewable water resources are dependent on the river Nile.

In July 2011, the Republic of South Sudan (RSS) became independent from the north. Incomplete state- and peace-building processes have prompted the emergence of new tensions over borders, resources and land. Uncertainties have increased in the wake of Arab Spring and about 40 per cent of the RSS budget is allocated to security.

PERVASIVE CONFLICT

Livestock farming and agriculture are the main occupations. Traditional farming practices are highly resilient to extreme climate variability, but war and displacement have destroyed many. Disputes between farmers and herders over changing seasonal grazing routes have grown amid a breakdown of traditional conflict resolution mechanisms, greater farming mechanisation and failing government policies. Cattle thefts trigger inter-tribal disputes and warfare. Displaced people and other migrants suffer direct exposure to violence and stresses including water and food insecurity: they lack knowledge of traditional coping mechanisms. Urban disputes are increasingly expressed in tribal terms: for example, in Juba, indigenous tribes accuse Dinka members of 'land grabs'. Informal wars between state armies have broken out, with ethnic cleansing forcing many people to flee.

There are unresolved questions about apportionment of oil revenues and the unfixed borders. Nile water allocation is complex; now Ethiopia and other upstream countries are trying to establish an

agreement to reduce allocations for Egypt and Sudan.

Human insecurity is therefore prevalent in both Sudanese states. Strengthening independent state institutions and accountabilities would allow for greater community participation in decision-making and diminish discontent, reduce armed opposition and allow for democratic processes and freedom of expression.



CONTACT

Jan Selby
Director, Sussex Centre
for International Security

T +44 1273 876 694

E j.selby@sussex.ac.uk

WINNERS AND LOSERS IN NIGER

WHAT ARE THE OVERRIDING AIMS OF THE LARGE N STUDY?

Conflict, while not an obvious factor relating to water security, is predominant in political discourse in Niger, and drought and flooding have greatly impacted livelihoods in the Sahel. Marginalised groups, in particular pastoralists, receive incongruent institutional support for their adaptations to climate events. Understanding how to frame institutional management of water resources is thus important to both scientific and political dialogues.

HAS THE SITE THROWN UP ANY LOGISTICAL OR POLITICAL CHALLENGES?

Yes. The insecurity in the northern territories of Niger produced highly uncertain security conditions while

working in or near these areas. Our key researcher (an American) followed strict security restrictions and worked with local research assistants to circumnavigate these challenges.

TO WHAT EXTENT HAVE YOUR FINDINGS BEEN IN LINE WITH EXPECTATIONS?

Our framing theory that divergent natural resource users have conflicting adaptation interests was confirmed. However, what surprised us was the great level of importance that institutional factors have in relation to conflict events and adaptive capacity. To promote cooperation and peace between historically conflicting natural resource users, institutions must promote sustainable, equitable adaptation decisions.

WHAT ARE THE BROADER SOCIAL OR POLICY IMPLICATIONS OF YOUR FINDINGS?

International and national policies addressing climate change adaptation need to focus on developing sound and accountable institutions that inform and empower local communities and enhance adaptive capacity for all groups, not just the political majority.



SUMMARY

Food insecurity is a constant threat in Niger for between 1 and 3 million people annually. While necessary institutions are in place in Niger, their roles and responsibilities need to be augmented and streamlined to deal effectively with climate change.

DIVERGENT ADAPTATION TO CLIMATE CHANGE AND CHANGE IN ECOSYSTEM SERVICES: A PASTORAL-AGRICULTURAL CASE STUDY OF NIGER

The livelihoods of people in the region of Tahoua are extremely vulnerable to shifts in climatic patterns, being largely supported by agriculture and livestock farming. The region has a history of intermittent flooding but drought and temperatures have gradually increased since the 1970s, with particularly high temperatures in the last couple of decades. The outlook is a slight increase in rainfall, and a change in pattern.

DIVIDED PEOPLES

Diverse cultural groups in Niger compete for resources and power. While democratisation and decentralisation processes are helping to create

a more devolved governance, the duality of leadership of north and south weakens governance overall. There are varying interpretations of laws, incongruent decision making and corruption. Rural policy frameworks for access to land and water are often poorly enforced. Conflicts arise about how resources are distributed and accessed: thus it is easier for agricultural farmers to obtain land than for traditionally nomadic livestock farmers. Institutions therefore have a great role both in contributing to the development of divergent adaptations and reducing their impacts. To promote cooperation and peace between historically conflicting natural resource users, they must promote sustainable, equitable adaptation decisions.

BELEAGUERED LIVESTOCK FARMERS

Institutions have attempted to secure agricultural land from harm caused by livestock through a system of setting aside routes for grazing and fines for damage to crops. Residues from agriculture, such as millet and sorghum stalks, are now sold

to livestock farmers instead of letting them graze their animals freely. Tuareg former rebel groups in the north now practise banditry and menace livestock farmers. These factors have led some livestock farmers to build their own wells and to cease to move their animals to different grazing territories as seasons change.

Human and climate-related factors in Niger have caused significant losses of ecosystem services which affect both livestock and agricultural farming. Expansion of agriculture and the consequent loss of pastureland is one of many divergent adaptation strategies causing increasing stress for livelihoods and promoting fear and hopelessness.

CONTACT

Julie Snorek
PhD Researcher CLICO Project, United Nations University

Institute for Environment and Human Security (UNU-EHS)

T +49 228 815 0235

E snorek@ehs.unu.edu

IGNORING THE VULNERABILITIES OF MIGRANT WORKERS IN THE SEYHAN BASIN OF TURKEY

WHAT CHARACTERISTICS MAKE THIS AREA PARTICULARLY RIPE FOR STUDY?

The Lower Seyhan River basin forms part of the wider Çukurova region, which has historically been one of the most fertile regions for agriculture-led development in Turkey. It is particularly important due to its transition in the 20th Century from a low-intensity agriculture region into hotspot for labour-intensive production. Recent climate projections show that agriculture in the region is increasingly threatened by hydro-climatic risks; social vulnerability of the marginalised populations in Seyhan remains as a hot topic.

HOW DOES THE SITE FIT INTO THE WIDER CLICO PROJECT?

The Lower Seyhan has particular characteristics of

significant importance as regards human security: high unemployment; seasonal labour migration economy based on agriculture; impact of salinisation on water resources; and integration into global markets. This case study explored the existing seasonal/circular labour migration pattern and associated social vulnerabilities.

CAN YOUR ANALYSES BE EXTRAPOLATED TO COMPARABLE REGIONS?

Yes. For example, we found that a significant part of agricultural wagedworkers come from disadvantaged populations; this can be related to undocumented Mexicans in US agriculture, lower castes in India or Kurdish, Arab or Roma groups in Turkish agriculture. These social groups

are vulnerable to changing climatic conditions since more often than not, they lack other forms of subsistence and their livelihoods are directly threatened by hydro-climatic changes.

WHAT ARE THE BROADER SOCIAL OR POLICY IMPLICATIONS OF YOUR FINDINGS?

State interventions to reduce the vulnerability to climate change of marginalised groups should work on improving social security, occupational health and safety, thereby targeting the root causes. Climate change adaptation policy must be considered in parallel with social policy concerns on labour conditions, public health, social exclusion and risk aversion.

SUMMARY



State policies can further sideline an already marginalised group in society.

MIGRANT AGRICULTURAL LABOUR, CLIMATE CHANGE ADAPTATION AND NEOLIBERAL STATE INTERVENTION IN TURKEY

The Seyhan river basin in the eastern Mediterranean covers approximately 25,000 km² and is the second biggest river drainage area in the region after the Nile. Seyhan is a highly productive agricultural area producing wheat and cotton, both of which are important crops for the Turkish economy, as well as vegetables and fruit.

Climate change projections show the likelihood of decreasing rainfall and snowfall, increased drought frequency and higher temperatures. As a consequence

of excessive groundwater extraction, the use of drainage water for irrigation and coastal regression, as well water reserves for agriculture, will be depleted. The growing population and associated increase in demand for water will also impact on agricultural productivity in Seyhan.

TEMPORARY WORKERS

The Çukurova region in lower Seyhan has long been a stage for confrontation between the people, global agricultural markets and state-led development schemes. Significant modernisation and intensification of agriculture in the basin led to high demand for cheap labour in the first half of the 20th Century; now, each year, 100,000 itinerant agricultural workers of Kurdish origin from South East Turkey arrive looking for temporary work.

Since the 1950s, the precarious working and living conditions of these seasonal migrants have been debated in Turkey, but little has changed. In 2001, agricultural reform replaced agricultural subsidies with direct income support. The Çukurova region now has the highest rate of unemployment in Turkey. There has also been a shift recently from capital-intensive

crops to labour-intensive crops and mounting mechanisation.

The groups in the area most vulnerable to climate change are smallholders and seasonal workers. Dispossession of rural communities, continued demand for cheap labour, class and ethnic segregation and geopolitical and global market changes place significant pressures on employment, housing, social security and urban safety, and there are recurrent tensions between farmers and migrant workers arising from delays in payments and poor conditions. The Turkish national strategies for climate change adaptation and improving benefits for seasonal labourers are concerned only with ensuring the bare minimum for survival and keeping the cost of the agricultural workforce low. The migrant workers are unrepresented and lack a voice, so are unable to change their socioeconomic future and reduce their vulnerabilities.

CONTACT

Ethemcan Turhan
PhD researcher, CLICO

T +34 622 776 624

E ethemcan@gmail.com

RESILIENT INSTITUTIONS FOR SHARING WATER AMONG NATIONS

WHAT CHARACTERISTICS MAKE THIS AREA PARTICULARLY RIPE FOR STUDY?

The Mediterranean, Middle East and Sahel is particularly useful to study when looking at adaptive capacity of transboundary river basins because the region is among those expected to be most affected by changes in water availability. Moreover, the river basins span a variety of levels of development, wealth, economic and political structures, thus making them ideal for a large-N study.

HAS THE SITE THROWN UP ANY LOGISTICAL OR POLITICAL CHALLENGES?

Data on some countries in the region, particularly in the Sahel, are lacking, and moreover, given

that recent uprisings across the Middle East have dramatically altered the socio-political context in the region, there may be limits to how historical data can serve as the best predictor of adaptive capacity in the future.

WHAT IS THE ONE MOST IMPORTANT MESSAGE YOUR RESEARCH HAS FOR A BROADER AUDIENCE?

Outside of the European basins, political instability and lower levels of governance pose a challenge for addressing the transboundary aspects of climate change adaptation, which must be addressed. Our analysis shows how international intervention to encourage cooperation in large river basins in Northern

Africa has led to increased authority to address transboundary water management; however, such change has not yet overcome differences in perspectives among riparians over how transboundary water should be managed.

WHAT ARE THE BROADER SOCIAL OR POLICY IMPLICATIONS OF YOUR FINDINGS?

Transboundary river basins demonstrate varying patterns of authority, national-level governance, common perspectives on shared waters, risk planning and provisions, information exchange, and interlinkages. Identifying the specific constellation of these characteristics of a basin is a useful means of improving interventions designed to address adaptive capacity.

SUMMARY



The adaptive capacity of transboundary basins in the Mediterranean, Middle East and Sahel differs very substantially; as a result, a greater understanding of the facilitating and mitigating factors surrounding transboundary adaptation is key to levelling the playing field amongst riparian countries.

A FRAMEWORK FOR MEASURING AND COMPARING ADAPTIVE CAPACITY

In order to compare the adaptive capacity of transboundary basins, the study first sought to quantify a set of measurable indicators. These factors were set within a framework comprising six previously unidentified features linked to institutional formation, effectiveness, and adaptive water governance: Authority, National-Level Governance, Common Perspectives,

Risk Planning and Provisions, Basin Information Exchange, and Linkages. The resulting data spanning each of 42 chosen basins in the Middle East, Mediterranean and Sahel region was used in a cluster analysis to produce an adaptive capacity typology identifying patterns of similarity and difference between basins.

NUMBER CRUNCHING

Metrics used to develop an index of high- and low- capacity basins pointed to an overall paucity of mechanisms for addressing uncertainty; despite evidence that compensation can provide some means of making up the shortfall from one domain to another, this is not applicable across all domains and stressors, serving only as a general indicator of trends.

Based on all their measured characteristics, the basins were subsequently categorised in one of six groups: Well Prepared, Good Neighbour, Mediated Cooperation, Dependent Instability, Self-Sufficient, and Ill Prepared. Such groupings become a vital component of ascertaining when and what intervention might be appropriate to improve adaptive capacity.

COLLECTIVE ACTION

The relative adaptive capacity of each transboundary basin analysed was looked at from the perspective of each riparian country, and defined overall as being either additive, wherein strengths in one domain may compensate for weaknesses in another; adhering to the 'best shot approach', hinging on the specific characteristics of individual riparians; or exhibiting a 'weakest link' effect, where the weakest riparians reduce the capacity of the basin. Of the 42 basins in the study, only 14 were shown to contain a weak link country. This serves to demonstrate that where transboundary adaptive capacity is reduced, it is likely to be as a result of weaknesses occurring across the basin; action to reverse the trend should therefore be taken at a regional level.

CONTACT

Anita Milman
Assistant Professor Department of
Environmental Conservation

University of Massachusetts at Amherst

T +1 413 545 3729

E admilman@cal.berkeley.edu

PALESTINE AND THE WEST BANK: A CONDUIT TO PEACE?

WHAT CHARACTERISTICS MAKE THIS AREA PARTICULARLY RIPE FOR STUDY?

In the Jordan valley basin, water is disputed between both Palestinian and Israelis, as well as between different sectors within the same country. The region is the food basket for both nations and makes a sizeable contribution towards gross national product (GNP); however, the area is beset by uncertainties and vulnerabilities caused by socioeconomic, political and climate change, which makes it an ideal case by which to study the impact of climate change on human security and conflict. More specifically, the study has been exploring the key attributes of internal as compared to transboundary water disputes, and vice versa, along with the impact of such conflict on human security in terms of food and water security.

HAS THE SITE THROWN UP ANY LOGISTICAL OR POLITICAL CHALLENGES?

Yes, as with any research project, there have been obstacles along the way. In this case these have been predominantly political challenges, not least both parties' willingness to control water resources (Palestinians and Israelis), and working within the practice of Israeli state hegemony when creating facts on the ground on which to base policies that control water and land-usage.

TO WHAT EXTENT HAVE YOUR FINDINGS BEEN IN LINE WITH EXPECTATIONS?

Our main finding is that the scale of the problem is bigger than expected. In terms of the possibility and likelihood of conflict, we have found that climate change can be a cause of deep poverty.

Moreover, given the magnitude of conflict within the Palestine lands (farmer-farmer and/or agriculture-domestic sector conflict) these internal battles have the potential to spread out into transboundary conflict, thereby becoming quickly exacerbated.

WHAT IS THE ONE MOST IMPORTANT MESSAGE YOUR RESEARCH HAS FOR A BROADER AUDIENCE?

Central to the study is its demonstration that mitigation or adaptation for the impacts of climate change on water resources can only be achieved by regional cooperation; plans made by countries in isolation will end in huge failure.

SUMMARY



Without recognition of the interdependence and equality of all residents in the West Bank, climate change is likely to damage an already fragile ecosystem and intensify Israeli-Palestinian conflict. However, transaction costs are driving a cooperative initiative that could deliver peace over water.

THE IMPLEMENTATION OF INTEGRATED WATER RESOURCES MANAGEMENT UNDER UNCERTAIN SOCIOECONOMIC, POLITICAL AND CLIMATE CHANGE CONDITIONS

The Jordan River basin is shared by much of Israel, the Palestinian territory of the West Bank and parts of Lebanon, Syria and Jordan. The region has an

arid climate and low and variable precipitation and is densely populated. Water is extremely scarce and climate change predictions show that this will worsen.

OCCUPIED TERRITORY

The Jordan Valley and the rest of the West Bank have been under Israeli occupation since 1967. Israeli occupation touches on all aspects of Palestinian life, and the Palestinian population is increasingly vulnerable to climate change impacts as a result. Subject to restrictions and infringements of their basic rights daily and, since 2000, an increased Israeli military presence, living conditions are harsh.

Following agreements in 1995 between Israel and the Palestinian Liberalisation Organisation, the West Bank was divided into three areas: A, B and C. Area C, which was intended to be under Israeli control for an interim period, covers 81 per cent of the Jordan Valley population. 65 communities of 28,246 people in area C rely mainly on herding and agriculture for their livelihood and so are extremely vulnerable to water shortages.

UNLIKELY COOPERATION

Droughts in the 1990s prompted Israel to construct desalination plants. Without access to the water by the occupied territory, this initiative is divisive. However, the proposed Red Sea Dead Sea Water Conveyance project would be a joint effort between Jordan, Israel and Palestine, involving the construction of an 180 km pipeline to transport 1.8 billion m³ of water from the Red Sea to the dwindling Dead Sea. Desalination would augment the fresh water supplies of all three countries.

The spur for cooperation is the cost and The World Bank is involved. The project would establish principles of interdependence and cooperation between the states for the first time.

CONTACT

Abedlrahman Tamimi
Director-General, Palestinian Hydrology Group for Water and Environmental Resources Development

T +972 599 204 690
E a.tamimi@phg.org

RURAL COMMUNITIES UNDER DROUGHT AND CLIMATE CHANGE STRESS IN CYPRUS

WHAT CHARACTERISTICS MAKE THIS AREA PARTICULARLY RIPE FOR STUDY?

With its location at the crossroads between three continents and its recent joining of the European Union (2004), Cyprus forms a bridge between the EU and non-EU CLICO case studies.

With an average annual precipitation of 460 mm over the area of the country and average temperatures of 26°C during the summer months, Cyprus is the driest country of Europe. Moreover, considering the projected drying of the Mediterranean region, Cyprus is a precursor of future climate conditions in southern Europe. Droughts have hit the country particularly hard during the past 15 years, resulting in severe

reductions of water supply for agriculture and regular water cuts for urban areas. The Government has now erred on satisfying all demand for water through the construction of five desalination plants, which run on fossil fuel and thus contribute to a further warming of the environment, while little attempt has been made to analyse options for reducing demand and optimising supply.

WHAT IS THE ONE MOST IMPORTANT MESSAGE YOUR RESEARCH HAS FOR A BROADER AUDIENCE?

One key message arising from our research is that rural communities are under stress from policy, socioeconomic and environmental changes. This affects the sustainability of rural environments, their

landscapes, heritage and food security. The pressures and changes are especially severe in arid and semi-arid environments, where agriculture is already at the margin of its extent.

WHAT ARE THE BROADER SOCIAL OR POLICY IMPLICATIONS OF YOUR FINDINGS?

In terms of broader implications, it is clear that more emphasis needs to be given to research and development of sustainable options and technologies for rural communities in semi-arid environments. While the Common Agricultural Policy (CAP) does provide support for agriculture, rural development and adaptation to climate change, there is insufficient scientific basis for allocating funds to support the long-term future of agriculture.

SUMMARY



Tourism contributes substantially to the economies of both northern and southern Cyprus, while farming is becoming less viable, yet exploration of the possible impacts of climate change on the tourism sector in Cyprus finds little concern.

VULNERABILITY OF RURAL COMMUNITIES IN THE MEDITERRANEAN REGION TO CLIMATE CHANGE AND WATER SCARCITY

Cyprus has a Mediterranean climate with substantially variable rainfall patterns, so is prone to both severe droughts and floods. Climate change projections indicate a significant decline in precipitation and an increase in temperatures for the island over the 21st Century.

While southern Cyprus – the Republic of Cyprus – is

a member of the European Union (EU), northern Cyprus is a Turkish territory. Accession to the EU has contributed to improved accountability and transparency of government in the Republic, but in practice there is still opacity and a tendency to cronyism in politics. EU membership has, however, raised the profile of environmental concerns and a number of EU policies for more sustainable management of natural resources have been adopted by the Government.

EFFECTS OF CLIMATE CHANGE

Climate change in the Republic will mainly affect farmers. Farmers reliant on irrigation use approximately 60 per cent of the water supply, and during drought years they are the first to be hit by water cuts. Droughts and variable precipitation also strongly impact mountain farming communities who rely on rain and groundwater resources. As a result, farming is becoming less attractive as a means of making a living and rural people are migrating to urban areas.

The application of a novel drought vulnerability index composed of hydro-climatic, social and economic indicators in each of Cyprus' rural municipalities led

to a counter-intuitive result: it is in fact the mountain villages with more water that are most vulnerable to drought and climate change. This is due to a variety of factors including depopulation, ageing population, underinvestment in water infrastructure and the vulnerabilities of their productive structure.

CHANGING FOR THE FUTURE

While policies currently focus on urban areas and securing water for the tourism sector through desalination, attention should therefore also be given to the needs of rural, and especially, mountainous areas, where communities are becoming exceptionally vulnerable to climatic extremes.

CONTACT

Adriana Bruggeman
Research Scientist, Hydrology and Water Management

T +357 22 20 86 20
E a.bruggeman@cyi.ac.cy

Manfred Lange
Director

T +357 22 20 86 21
E m.a.lange@cyi.ac.cy

UNSAFE GROUND: MAL-ADAPTATION IN SARNO, CAMPANIA

WHAT CHARACTERISTICS MAKE THIS AREA PARTICULARLY RIPE FOR STUDY?

Sarno is one of the 212 municipalities in the Campania region, Italy, which, due to their volcanic soil are at risk of mudslide and or flash-floods. In 1998 Sarno was struck by hundreds of debris flows from the collapsing mountain, which caused 137 fatalities in the city and more than €24 million in damages. Campania has experienced hundreds of such hydrogeological disasters in the past and landslides are a major concern for human security. Too much rain in short periods saturates the soils and increases the likelihood of a mudslide, but it is unclear yet if climate change will increase future risks, and ongoing research is therefore required.

HAS THE SITE THROWN UP ANY LOGISTICAL OR POLITICAL CHALLENGES?

Many years have passed since the mudslide, and people were initially surprised that we wanted to return to it. Our specific interest was to ascertain how the authorities responded to the tragedy, in order to learn from it, become safer and better adapt to future risks. Policy makers were very reluctant to talk to us or share any data about the investment programme that dealt with the strategy; this was not an accident, we discovered, but had to do with the opaque ways in which money was spent, and the questionable efficacy of the disaster response. Unfortunately, we found the region as a whole to be still very vulnerable to mudslides and disasters such as the one at Sarno..

WHAT IS THE ONE MOST IMPORTANT MESSAGE YOUR RESEARCH HAS FOR A BROADER AUDIENCE?

The most important message is that large-scale infrastructures such as the system of canals and dams built to protect Sarno from future mudslides are not in fact the best way to reduce risks. Softer ecological engineering solutions can stabilise mountains at a lower cost. And it is much less costly to move people to new safer settlements than to spend money on infrastructure just to keep them in the same dangerous zones. The problem is that States prefer large-scale infrastructures because they are visible, politically popular and also because they circulate money.

SUMMARY



An extraordinarily expensive but limited state intervention that followed a natural disaster in Sarno is typical of institutional responses towards environmental tragedies in many parts of the world, 'de-politicising' a problem and, as a result, failing to solve it for the long term.

HUMAN SECURITY IN A LOOSE TERRITORY:
INSIGHTS FROM THE (QUASI) NORTHERN
CAMPANIA REGION.

The Campania region in southern Italy is particularly vulnerable to earthquakes and landslides, and 86 per cent of its municipalities have experienced landslides or

are at risk. A landslide in the Sarno valley in Campania in 1998 left 1,210 people homeless, causing 160 deaths and more than €33 million damage. Sarno town, a retail, agriculture and building centre at the base of a mountain, was the most severely affected.

Sarno declined from its position as a thriving manufacturing town after the Second World War. Construction of houses and apartments became a major activity, much of which was in unauthorised areas.

THE €500 MILLION INTERVENTION

After the landslide, which destroyed properties near the mountain, a state of emergency was declared and laws were passed to respond to the crisis. Conflict emerged between citizens and government organisations around the idea of resettlement. Many people wanted their houses to be rebuilt in the affected area, even though it was exposed to mudslides. A massive engineering project was undertaken to stabilise the mountain ridge and channel further mudslides down a pipeline. However, it would be much less expensive to subsidise the relocation of people away from the dangerous zone and into the many unoccupied houses in the Sarno city centre.

Moreover, while much of Sarno itself is now protected, of the 212 towns and villages at risk in the wider region, the grand majority remain exposed, since all money was diverted to Sarno.

A CASE OF MAL-ADAPTATION

Recent studies have tried to demonstrate that changes in rainfall patterns in southern Italy could amplify vulnerability in areas already affected by rapid mudslides. There has been no investment in proactive measures to withstand such impacts in most of Campania. Furthermore, there is a fixation with large-scale and expensive protective infrastructures, built after the event, and this is a clear mal-adaptation. Money should be spent instead on establishing early warning systems, strengthening capacities and human resources to deal better with disasters, and regulating land-uses to reduce exposure in disaster zones.

CONTACT

Giacomo D'Alisa
Research Fellow at ICTA,
Universitat Autònoma de Barcelona

T +346 22 31 15 79
E giacomo.dalisa@uab.cat

DEALING WITH CLIMATE UNCERTAINTY IN INTERNATIONAL WATER TREATIES



WHAT CHARACTERISTICS MAKE THIS AREA PARTICULARLY RIPE FOR STUDY?

We worked on a global database of 289 treaties. We did not work on a regional dataset. The idea behind this was that we could get statistical insights beyond the regional ones. Interestingly, in our

analysis we did not find any statistical significant differences between regions.

HOW DOES THE SITE FIT INTO THE WIDER CLICO PROJECT?

The biggest issue in transboundary water conflicts is the uncertainty that originates from climate change. Uncertainty is an issue since inability to accommodate it has already been found to impair the effectiveness of water treaties. In addition, there exists an academic void on how treaties can accommodate uncertainty.

HAS THE SITE THROWN UP ANY LOGISTICAL OR POLITICAL CHALLENGES?

Since this project was not based on an in-

depth case study but on building a database of water treaties, we did not encounter any major problems. That said, we did spend a lot of time gathering water treaties from Africa and Asia, and the lack of transparency in some of those sites was something of an obstacle.

TO WHAT EXTENT HAVE YOUR FINDINGS BEEN IN LINE WITH EXPECTATIONS?

We were expecting to identify a trade-off between strategies to accommodate uncertainty; however, this proved not to be the case. In fact, contemporary treaties simply become more complicated as they include more mechanisms to address uncertainty that correspond with a variety of strategies.

SUMMARY

While reaching consensus in international treaties is critical, the key stumbling block of both properly delineating and accounting for uncertainty must first be overcome.

UNCERTAINTY AND INTERNATIONAL TREATIES

Over the last 200 years, although 400 transboundary agreements on water have been established, those that are based on historic rainfall patterns may be inadequate for the future and may in fact amplify social, economic or demographic stress. But a significant number of major shared water courses such as the Nile basin lack conflict resolution mechanisms and are therefore ill-prepared for climate change.

Climate change is inducing uncertainty in water availability, timing and quality which is likely to increase mutual dependency between states that share river basins.

MANAGING UNCERTAINTY

Ways to govern uncertainty are an essential feature of adaptation for trans-boundary water sources, including the adoption of conflict resolution

mechanisms (CRMs). Assessment of river basins in the Mediterranean, Middle East and Sahel regions according to whether they are subject to treaties or have managing organisations, and the degrees of trade links and interdependency between users, found that few were well-prepared, with high adaptive capacity for climate change. Climatic variability were shown to be important, but political factors and water dependency and scarcity had a greater influence on adaptive capacity and CRM conditions. However, mechanisms to reduce uncertainty are underrepresented in treaties and CRMs are rare.

UNIQUE DESIGNS

Although some formal agreements such as that for the Nile basin are in place, basins that do not hold shared water norms require agreements on underlying norms in order to achieve a shared vision. While basin management should have formal mechanisms to address uncertainty, there is no 'one size fits all' design: treaties have to reflect the unique political, institutional and ecological context of each case. African basins without CRMs, often a legacy of colonial power,

need updated agreements involving all parties. Once such accords are adopted, the likelihood of further consolidation increases, so negotiations should open with simple CRMs that can be further developed in the future. Many basins would benefit from improved information sharing and policies that reduce transaction costs, share values and make negotiations between countries less burdensome.



CONTACT

Itay Fischhendler
Senior Lecturer, The Hebrew
University of Jerusalem

T +972 25 88 33 49

E fishi@mscc.huji.ac.il

HIGHLY RESILIENT PEOPLES: SUDR

WHAT CHARACTERISTICS MAKE THIS AREA PARTICULARLY RIPE FOR STUDY?

The Sudr region is extremely vulnerable to climate change manifestations, with drought and flash floods among the major features affecting the area and causing considerable concern regarding human security.

HOW DOES THE SITE FIT INTO THE WIDER CLICO PROJECT?

Conflicts caused by water issues, for example water shortage or flooding, have had a strong influence on human security and wellbeing in Sudr, which ties in very neatly with the research interests of CLICO. Moreover, the area is home to both urban and rural communities, adding a key area for comparison to the analyses.

CAN YOUR ANALYSES BE EXTRAPOLATED TO COMPARABLE REGIONS?

One main lesson we have learned is the important role of governance in helping to harness climate change impacts. In those areas affected by climate uncertainty, strong bridges should be established between governance and populations; otherwise, all adaptation efforts will have been wasted.

WHAT IS THE ONE MOST IMPORTANT MESSAGE YOUR RESEARCH HAS FOR A BROADER AUDIENCE?

One of the major messages arising from our work is about local knowledge and its potential role in combating climate change. Adaptation measures to climate change should consider the local knowledge of

people in these areas and consider them as a potential think tank that can help communities to overcome the difficulties created by climate change that they face.



SUMMARY



Two very different groups in the region of Sudr show significant capacity for adaptation: one by applying knowledge of the fragile desert ecosystem, and the other because of the employment and health benefits of town living.

VULNERABILITY OF SUDR TO CLIMATE CHANGE, THE LIVELIHOOD INDEX, AND AN APPROACH TO ASSESS RISKS AND DEVELOP FUTURE ADAPTATION STRATEGY

Sudr is situated on the Gulf of Suez in the south Sinai region of Egypt. Its climate is extremely arid and its population is predominantly Bedouin. The Bedouin are not politically or legally recognised as a group; however,

since the 2011 revolution, conflicts between Bedouin and state authorities have raised the Bedouin profile politically, which has encouraged them to stake claims to civil rights.

There is a small urban community in the town of Sudr, which lies on a floodplain. The urban standard of living has been recently improved by new job opportunities arising from a flourishing tourist village. A larger rural community in the mountainous desert relies on agriculture and herding for their livelihoods. Both communities are characterised by poverty; but poor sanitation and government restrictions on access to water make the rural Bedouin more vulnerable to ill health than their urban counterparts. Many rural Bedouin have migrated away from the area; increasingly it is the more vulnerable that are left behind.

Sudr regularly experiences both flash floods and drought. Flash flooding has damaged road infrastructures and housing, contaminated farmland and destroyed irrigation pipes and wells. The Bedouin hold government officials responsible, asserting that they mismanage water resources.

CONFLICT AND COOPERATION

The rural Bedouin are skilled in predicting drought and flooding from signs in the desert ecosystem, but many of their practices also deepen drought impacts. Water scarcity has triggered clashes between Bedouin families over well-drilling and ownership and an influx of non-Bedouin people has also caused conflicts; however, during flash flooding in 2010, rural Bedouin sent warning messages to other tribes in the floodplain.

Alleviating poverty and unemployment would help both Sudr populations. But proactive disaster prevention and management, such as building a canal in the pathway of floodwaters and integrating Bedouin knowledge in climate adaptation policies, is a prerequisite for security in Sudr.

CONTACT

Mohamed Tawfic Ahmed Aly
Professor, Suez Canal University

T +20 64 381 860

E motawfic@tedata.net.eg



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