EcoPeace
Middle East

Climate Change, Water Security, and National Security for Jordan, Palestine, and Israel

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Representative Office
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Ramallah

Embassy
of the Federal Republic of Germany
Amman

THE PROJECT

The present paper is part of a regional EcoPeace Middle East project, which was uniquely comprised of a set of three national roundtables held in Amman, Ramallah, and Tel Aviv, and a regional roundtable, which took place in November 2018 at the Dead Sea, Jordan, as part of the 2018 EcoPeace Annual Conference. At each event, participants from a broad spectrum of stakeholders, including government, academia, think tanks, private sector, and civil society actively engaged in discussions on climate change and its implications for national and regional security. This paper is the sole responsibility of EcoPeace Middle East but was highly influenced by the opinions expressed during the roundtables. The roundtables and the production of the present discussion paper were supported by the Embassy of the Federal Republic of Germany Tel Aviv, the Representative Office of the Federal Republic of Germany Ramallah, and the Embassy of the Federal Republic of Germany Amman. The report is the sole responsibility of EcoPeace Middle East and in no way reflects the opinion of our funders.

ECOPEACE MIDDLE EAST is a unique organization at the forefront of the environmental peacemaking movement. As a tri-lateral organization that brings together Jordanian, Palestinian, and Israeli environmentalists, our primary objective is the promotion of cooperative efforts to protect our shared environmental heritage. In so doing, we seek to advance both sustainable regional development and the creation of necessary conditions for lasting peace in our region. EcoPeace has offices in Amman, Ramallah, and Tel-Aviv.

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LIST OF ABBREVIATIONS

CCD	Climate Change Directorate
EDP	Executive Development Program
EQA	Environmental Quality Authority
EUISS	European Union Institute for Security Studies
FsV	Facilitative Sharing of Views
GHG	Greenhouse Gas
ICCIC	Israel Climate Change Information Center
IDP	Internally Displaced Person
INCR	Initial National Communication Report
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
ITNC	Israel's Third National Communication on Climate Change
JWC	Joint Water Committee
JNCCP	Jordan's National Climate Change Policy
JTNC	Jordan's Third National Communication on Climate Change
MENA	Middle East and North Africa
MoEnv	Jordanian Ministry of Environment
NAMA	Nationally Appropriate Mitigation Actions
NAP	National Adaptation Plan
NGGP	National Green Growth Plan
OCHAOPT	United Nations Office for the Coordination of Humanitarian Affairs in the Occupied Palestinian Territory
PNA	Palestinian National Authority
PNDC	Palestine's Nationally Determined Contributions
PWA	Palestinian Water Authority
UFW	Unaccounted For Water
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
UNSCO	Office of the United Nations Special Coordinator for the Middle East Peace Process
RCP	Representative Concentration Pathways
RSDS	Red Sea-Dead Sea Project
TNC	Third National Communication
WEN	Water Energy Nexus

EXECUTIVE SUMMARY

The Middle East and North Africa (MENA) region is considered a climate hotspot due to its natural water scarcity, low levels of socio-ecological resilience, social tensions and political conflicts, and ongoing immigration crisis. Over the course of the century, Jordan, Palestine, and Israel are projected to experience an average temperature rise over the Mediterranean of ~1.4C to ~4C; a general decrease in precipitation of 25 percent regionally and up to 40 percent locally; a shift in rain seasons from winter and spring to autumn; a higher frequency and intensity of extreme weather events such as droughts, flash floods, and forest fires; as well as a growing rate of desertification. Despite the effects of climate change being already observable in the region, the three countries have yet to fully recognize the connection between the negative impact of climate change on their neighbors' national security, and the implications for their own national security. Based on this lack of understanding, Jordan, Israel, and Palestine have done little to develop a regional, integrated roadmap for climate-related national security.

This report concludes that too little attention is being paid to the implications of climate-related change for national and regional security. The term threat or risk multiplier is often used to describe the catalytic effect of climate-related change on states and societies. In this sense, it is not the climatic changes themselves that are said to cause insecurity. Rather, it is the adaptive capacity of a state that ultimately determines the extent to which climate-related change impacts the socio-economic development and political stability of a country and, therefore, of a region. The adaptive capacity of a state is weakened if the country exhibits unstable political institutions with low accountability, political repression and/or corruption, social tensions, a history of intra- or inter-state conflicts, as well as unsustainable livelihoods and damaged infrastructure, among others.

In the regional context of Jordan, Israel, and Palestine, climate-related changes are forecasted to impact a wide range of sectors where the adaptive capacity of the state might already be weak, particularly in Jordan and Palestine. These include:

- reduced availability of natural water leading to greater difficulty to meet domestic water needs and resulting in rationing of water. The intermittent water supply fuels public animosity that is already present on non-water related issues.
- reduced agricultural production as a result of less available water, higher temperatures, and extreme weather events. Lower exporting capacity and higher dependence on imported foods are likely going to cause higher food prices, lower and less stable incomes, and possible food shortages for some staple food products.
- economic recession in the agricultural sector as a result of lower agricultural yield could lead to the erosion of livelihoods, internal displacement of people, and greater food insecurity.

- increased pressure on physical infrastructure due to extreme weather events that leads to the collapse of infrastructure in the field of transport, electricity, and other essential services, as well as loss of life due to resulting accidents.
- outbreak of new climate-related diseases, placing additional stress on already inadequate health services contributing to the overall deterioration of public health.

These impacts will have serious implications for the social and political stability of the region. Systemic failure to respond to humanitarian and environmental crises creates dissatisfaction with the governing authorities. The built-up pressure from within may inadvertently ignite public turmoil that will challenge the resilience of the system. In the context of the highly inflammable Israeli-Palestinian conflict, this could easily transmute into uprisings and mass riots that transcend national borders and threaten national security in Israel, Palestine, and Jordan.

At the same time, Jordan's acceptance of hundreds of thousands of Syrian refugees since the onset of the civil war has put the country before new challenges. The stark influx of refugees has already strained Jordan's finances, its natural resources, as well as the patience of its people.

Regional Cooperation

The bilateral agreements in place between Israel and Jordan and interim agreements between Israel and Palestine were never designed to accommodate climate-change related events such as steadily declining water availability, prolonged droughts, and other extreme weather events. The repercussions of climate change will be felt on multiple dimensions – from global outcomes to national, regional, and local reverberations. Though the writing is on the wall, especially following the Syrian civil war, the national security-related implications of climate change on the broader region's stability has not led to a significant change in policy or willingness to cooperate across borders.

Regional cooperation is needed to combat the threats of climate change that will in turn be a step in a cycle of positive interactions that builds trust. The Water Energy Nexus project developed by EcoPeace Middle East and the Konrad Adenauer Foundation offers one such opportunity through which all three countries engage in a regional approach to counter the effects of climate change and its potential negative security implications, while advancing water and energy security region wide.

Policy Recommendations

Based on a set of national roundtables organized by EcoPeace Middle East and held in each country during 2018, and a regional roundtable held at the Dead Sea in Jordan in November 2018, EcoPeace Middle East proposes the following policy recommendations:

1. Promote a paradigm shift to integrate climate change considerations onto the national security agenda of each country. This entails the assessment, analysis, and development of strategies to respond to the national security threats of climate change at the highest levels of the respective, often competing, national security directorates and authorities in each country.
2. Resolve final status natural water allocations between Israel and Palestine, so that cooperation can advance based on greater political certainty in the water sector for Palestine.
3. Create a roadmap for a regional approach to address climate change adaptation and mitigation issues.
4. Devise strategies to effectively upgrade and improve water infrastructure and tariffs (Jordan and Palestine).
5. Encourage the international community to invest in national projects in Jordan and Palestine that advance regional approaches to climate change issues.

INTRODUCTION

There is widespread consensus within the scientific and political community that global climate change is underway, human-induced, and has already had observable effects on our environment. According to the United Nations Environment Program (UNEP), climate change "is the major, overriding environmental issue of our time, and the single greatest challenge facing environmental regulators. It is a growing crisis, and has economic, water, health and safety, food production, security, and other dimensions."[1] The Middle East and North Africa (MENA) region has been identified as a climate hotspot. Part of this is due to the MENA's natural water scarcity, with many of the MENA countries having one of the lowest per capita water availability in the world, coupled with the region's low levels of socio-ecological resilience, social tensions and political conflicts, and ongoing immigration crisis.

Israel, Palestine, and Jordan are three neighboring countries at the heart of the MENA region. All of them are grappling with water scarcity in different ways and to different degrees. While Israel has become a trailblazer in the field of water technology, the failure to reach a fair water allocation and management agreement between Israelis and Palestinians is putting the Palestinian water sector under huge stress and continues to breed animosity that will only accelerate under climate change. Meanwhile, the influx of nearly one and half million Syrian refugees is further straining Jordan's water supplies – already one of the lowest in the world. Climate change is expected to further exacerbate the water stress in these three countries.

Scientific climate models for the MENA region provide information on projected climate variations in the region. They do not, however, offer insight into the social and political implications resulting from the impact of climate change. By building on earlier research, the objective of this paper is to analyze the consequences of climate change not from a scientific, but from a socio-political perspective. In doing so, this paper poses the following questions: What is the relationship between climate change and social conflict? Can climate change act as a threat multiplier, exacerbating already existing social tensions in the region? What are the implications of declining water levels, refugee movements, and resource conflicts for the regional and national security interests of Jordan, Palestine and Israel?

Part I of this paper provides an overview of the effects of climate change on Israel, Palestine, and Jordan. Part II analyzes the geopolitical implications of climate change for the security of each of the three countries and the region as a whole. Part III outlines and assesses the effectiveness of various policy measures undertaken by each country to mitigate or adapt to climate change, and makes arguments for the need for regional cooperation on climate change. Part IV offers policy recommendations as to what actions should be pursued individually by each country and jointly by the region to combat climate change and its implications for regional and national security.

1 "Climate Change - Introduction," United Nations Environment Programme (UNEP), n.d., https://na.unep.net/geas/climate-change.php.

PART I: OVERVIEW OF THE EFFECTS OF CLIMATE CHANGE ON THE MENA REGION

The MENA region is characterized by an arid to semi-arid climate and one of the lowest per capita water availability in the world. At the same time, the region is rich in fossil fuels, leading to a steadily growing industry coupled with a rising demand for water and electricity. As a result, the region is now home to the fastest growth rate of emissions globally, representing 4.5 percent of global greenhouse gases (GHG) worldwide.[2]

The Intergovernmental Panel on Climate Change (IPCC) identified the MENA region as a climate change hotspot due to its natural water scarcity, low levels of socio-ecological resilience, social tensions and political conflicts, and ongoing immigration crisis.[3] Predicting the impact of climate change on the region is not an easy task. Despite widespread consensus about the general impact of global climate change, specific projections must take into account regional, national, and even local climatic variations. The use of different climate models, research methods, and research purposes adds complexity to the task, often leading to disagreements, and even contradictions about climate change predictions. This trend is also observable when looking at climate change predictions for Israel, Palestine, and Jordan. For this reason, the climate projections presented in this paper should be seen as general estimates derived from a wide range of studies but should nevertheless be treated with caution.

Data collected to measure the effects of climate change in the MENA region indicate the following climatic trends by the end of the century:

1. A rise in minimum and maximum daily temperatures with an average temperature rise over the Mediterranean of ~1.4º by mid-century up to ~4º locally by the end of the century.
2. A general decrease in precipitation of around 20 percent and up to 40 percent locally.
3. A shift in rain seasons from winter and spring to autumn.

2 Rana Alaa Abbass, Prashant Kumar, and Ahmed El-Gendy, "An overview of monitoring and reduction strategies for health and climate change related emissions in the Middle East and North Africa region," *Atmospheric Environment* 175 (2018): 34 citing Mutasem El Fadel, Grace Rachid, Renalda El-Samra, G. Bou Boutros, and J. Hashisho, "Emissions reduction and economic implications of renewable energy market penetration of power generation for residential consumption in the MENA region," *Energy Policy* 52 (2013): 618–627.

3 See Andrea Rizzo, "Transparency of Climate Action in the ENPI South Region by Andrea Rizzo," *ClimaSouth Project* (Policy Series Paper Nr. 1, 2016): 7; Hossein Tabari and Patrick Willems, "Seasonally varying footprint of climate change on precipitation in the Middle East," *Scientific Reports* 8 (2018): 1-10; Isabelle La Jeunesse et al., "Is climate change a threat for water uses in the Mediterranean region? Results from a survey at local scale," *Science of The Total Environment* 543, part B (2016): 981-996; Mikkel Fugl Eskjær, *Climate Change Communication in Middle East and Arab Countries*, (Oxford Research Encyclopedia of Climate Science, Oxford University Press, September 2017).

4. A higher frequency and intensity of extreme weather events such as droughts, flash floods, and forest fires, as well as a growing rate of desertification.

By analyzing past mean temperatures over the Mediterranean, scientists were able to discern a statistically significant and spatially coherent temperature increase of 1.5-4° over the past century.[4] Research points to a continuous warming trend in the Middle East, with temperatures rising by 1.4° in the first half of the century and by an additional 2.54° by the end of the 21st century. Significantly large temperature increases are expected for the summer. Data further indicates an abnormally high rise of water temperature in the Persian Gulf and the Red Sea.[5]

Water resources are already stressed in the Middle East, where population growth and rising water demand are said to halve the region's per capita water availability by 2050.[6] The effects of climate change will further exacerbate existing water stress. In their study of seasonally varying patterns of climate change on precipitation in the Middle East, Tabari and Williams (2018) explain that arid and semi-arid regions such as the Middle East are particularly exposed to the effects of climate change, and predict with high confidence that the region will suffer from a decrease of water resources as a result of lower rates of precipitation, river flow, and groundwater recharge. Their projections are derived from data on past precipitation over most of the Mediterranean, which points to a significant decrease of rainfall over the past 50 years. Trondalen (2009) as well as Kitoh, Yatagai, and Alpert (2008) predict that the Fertile Crescent could lose its current shape or potentially disappear altogether by the end of the century. The Jordan River's total runoff at the outlet of the catchment area is said to decrease by 23 percent.[7] This trend is already observable in the main stream of the upper Jordan River, the Dan stream, which recorded its lowest output in historical record in 2018; as well as the Unity Dam on the Yarmouk River border of Jordan and Syria, the main tributary of the lower Jordan River, which has never filled since its completion in 2006.[8] Tabari and William's (2018) further stipulate that lower precipitation rates are accompanied by a shift of the rain season from winter and spring to autumn. This could mean that much of the rain could fall outside

4 Jon Martin Trondalen, *Climate Changes, Water Security and Possible Remedies for the Middle East* (The United Nations World Water Assessment Programme, 2009, United Nations Educational, Scientific and Cultural Organization), 7, http://unesdoc.unesco.org/images/0018/001818/181886e.pdf, citing Pinhas Alpert, Simon Krichak, H. Shafir, D. Haim, and I. Osetinsky, "Climatic trends to extremes employing regional modeling and statistical interpretation over the E. Mediterranean," *Global and Planetary Change* 63 (2008): 163–70.

5 Jason Evans, "21st Century Climate Change in the Middle East," *Climatic Change* 92, no. 3 (2009): 425.

6 The World Bank, *Making the Most of Scarcity: Accountability for Better Water Management in the Middle East and North Africa* (Washington D.C.: The World Bank, MENA Development Report, 2007) 5, http://siteresources.worldbank.org/INTMNAREGTOPWATRES/Resources/Making_the_Most_of_Scarcity.pdf.

7 Trondalen, "Climate Changes," 9. See also Gerhard Smiatek and Harald Kunstmann, "Expected Future Runoff of the Upper Jordan River Simulated with a CORDEX Climate Data Ensemble," *Journal of Hydrometeorology* 17, no. 3 (2016): 865-79. Results of this study indicate a reduction of the Upper Jordan's discharge by 7.4 percent by 2031- 2060 and 17.5 percent by 2071-2100.

8 Royal HaskonigDHV/EcoPeace Middle East, *National Master Plan for the Jordan River Valley* (2015) 32, http://ecopeaceme.org/uploads/Jordanian_National_Master_Plan.pdf.

of the crop growing season, with detrimental effects on the region's agricultural and food sectors.[9]

In addition to a general temperature rise and a decrease in precipitation, research also indicates a trend towards more frequent extreme weather events. Extreme summer heat waves and droughts are expected to occur more frequently and more severely. While precipitation is said to become rarer, it is also expected to become more extreme, with flash floods and intense rainfall projected for all seasons but with the "highest increase in autumn [and] lowest increase in spring".[10] Rising seawater levels were recorded in the Mediterranean Sea over the past two decades, leading researchers to project increased flooding and intrusion of seawater into the coastal aquifer of Israel and Gaza. Wave storms with wave heights of over six meters could pose a major threat to coastal infrastructure and the coastal cliff.[11]

Table 1: Climate Projections for Jordan, Palestine, and Israel.

Climate Change Impact on Environment	
Temperature[12]	• Medium-end scenario predicts a rise up to ~3°C (up to 4°C during the summer in Jordan) by the end of the century • More severe warming during the summer, less warming during the winter • Mediterranean Sea will warm significantly
Precipitation[13]	• Medium-end scenario predicts a decrease in precipitation of between 10-30 percent (with local projections Jordan suggesting up to 60 percent in Jordan) • Increase in evapotranspiration
Seawater Level[14]	• Seawater level rise of the Mediterranean of 10mm/year leading to loss of land • Acidification and temperature increase of seawater
Extreme Weather[15]	• Increase of extreme weather events such as floods droughts, and heat waves (with temperatures in Jordan up to 44°C)

9 Tabari and Willems, "Seasonally varying footprint of climate change," 3.

10 Tabari and Willems, "Seasonally varying footprint of climate change," 1; see also Trondalen, *Climate Changes*, 1-32.

11 "Potential Effect on Israel - Predicted Climate Change in Israel," Israel Ministry of Environmental Protection, last modified November 5, 2013, http://www.sviva.gov.il/English/env_topics/climatechange/Pages/PotentialImpactOnIsrael.aspx.

12 Jordanian Ministry of Environment, The National Climate Change Policy of the Hashemite Kingdom of Jordan 2013-2020 (JNCCP): Sector Strategic Guidance Framework, (2013), 24, 122-127, http://www.moenv.gov.jo/AR/PDFs/Climate%20change%20policy_PDF.pdf; State of Israel/Ministry of Environmental Protection, Israel's Third National Communication on Climate Change (ITNC): Submitted to the United Nations Framework Convention on Climate Change, (2018), 65, https://unfccc.int/sites/default/files/resource/UNFCCC%20National%20Communication%202018.pdf; State of Palestine/Environment Quality Authority, National Adaptation Plan (NAP) to Climate Change, (2016), 109, https://unfccc.int/files/national_reports/non-annex_i_parties/application/pdf/national_adaptation_plan__state_of_palestine.pdf.

13 JNCCP, 24, 128-129; ITNC, 66; NAP, 109.

14 ITNC, 67-68; NAP, 26.

15 JNCCP, 131-133, 140; ITNC, 66; NAP, 73.

Climate Change Impact on Different Sectors	
Water[16]	• Reduced water availability due to temperature increases, lower rates of rainfall and higher evaporation • Lower groundwater levels, exacerbated by droughts • Higher demand for water because of rising temperatures • Salinization of water resources through intrusion of seawater
Agriculture[17]	• Reduced productivity due to higher temperatures, less rainfall, droughts, short growing season and seasonal shifts of rainfall • Increasing use of treated wastewater (TWW), herbicides, insecticides, and fertilizers may pose a health risk and can cause the loss of land. • Dust storms may cause erosion and soil loss due to prolonged dry soils • High seasonal temperature variability will threaten cold- and heat-sensitive crops
Biodiversity[18]	• Droughts, forest dieback, habitat degradation and species loss • Increased desertification, leading organisms to shift their range of activity • Coral bleaching and a breakdown of mutualistic relationships of algae and corals due to temperature increase, leading to the death of coral reefs in the Red Sea
Health[19]	• Increased risk of Typhoid fever or Hepatitis A; water, vector, and food-borne diseases, as well as malnutrition, stunting, air-borne and respiratory diseases • Increased risk of cardiovascular and respiratory diseases as well as heat strokes • Food shortages may lead to malnutrition

16 ITNC, 15, 66; The Hashemite Kingdom of Jordan, Jordan's Third National Communication on Climate Change (JTNC) (2014), 114, 140, http://www.undp.org/content/dam/jordan/docs/Publications/Enviro/TNC%20jordan%20pdf.pdf; NAP, 41-43.

17 ITNC, 16, 72; JTNC, 149-153; NAP, 21-26.

18 ITNC, 67-69; JTNC, 157-166; NAP, 57.

19 NAP, 33-34; ITNC, 69-70; JTNC, 188-194.

PART II: CLIMATE CHANGE IMPLICATIONS FOR NATIONAL AND REGIONAL SECURITY

Climate Change and Security

The study on the relationship between climate change and national and international security at the global level has gained significant momentum over the past fifteen years. Security, in this sense, is defined not in a narrow, strictly military sense, but examined from a human security perspective, encompassing a great variety of harms to human welfare including hunger, human health, political repression, crime, and environmental security.[20]

The term threat or *risk multiplier* is often used to describe the catalytic effect of climate-related change on states and societies. In this sense, it is not climate variability itself that causes insecurity, as countries can develop adaptation measures to soften the blow of climate change on their environment and people. Rather, it is the adaptive capacity of a state that ultimately determines the extent to which climate-related changes impact the socio-economic development and political stability of a country. The adaptive capacity of a state can be significantly reduced in the case of weak and ineffective political institutions with low accountability, political repression and/or corruption, social tensions, a history of intra- or inter-state conflicts, as well as unsustainable livelihoods and damaged infrastructure, among others.[21] Increased vulnerability is further ascribed to a high dependency on agricultural production, large numbers of migrants, and a weak or non-existing social support system.[22]

Thus, climate change does not automatically lead to human insecurity or conflict. More accurately, climate-related change can act as an additional driver of fragility, amplifying pre-existing political, social, economic, and environmental challenges, and thus possibly undermining security, triggering and/or intensifying conflicts.[23] This also means that any relationship between climate variability and conflict is highly context-specific and contingent on a complex interplay of physical and social variables.[24]

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20 See CLICO, *Climate change, water conflicts and human security in the Mediterranean, Middle East and Sahel: Findings and recommendations from the CLICO FP7 SSH research project*, (European Research Area, European Policy Brief, 2012), 1, https://www.ecologic.eu/sites/files/publication/2013/CLICO_policy_brief4_final_Nov2012.pdf.

21 See FAO and The World Bank Group, *Water Management in Fragile Systems: Building Resilience to Shocks and Protracted Crises in the Middle East and North Africa* (Cairo: World Bank Group, Discussion paper, 2018) 22, http://www.fao.org/3/i9730en/I9730EN.pdf; SIDA, The relationship between climate change and violent conflict (SIDA Working Paper 2017) 15, https://www.sida.se/contentassets/c571800e01e448ac9dce2d097ba125a1/working-paper---climate-change-and-conflict.pdf.

22 See Joshua Busby, "Taking Stock: The Field of Climate and Security," *Current Climate Change Reports* 4 (2018): 338–346. See also CLICO, *Climate change, water conflicts and human security*.

23 See FAO and The World Bank Group, *Water Management in Fragile Systems*; CLICO, *Climate change, water conflicts and human security.*

24 To better understand this causality, researchers studied a number of conflict cases that exhibit an indirect link to climate-related change. Among the most prominent cases are the civil war in Syria, Lake Chad, Iraq, Iran, Yemen, Algeria, and Libya.

What does the connection between climatic changes and security risk mean for the Middle East, a region with low levels of natural resources but high levels of inter- and intra-state conflict? The following section analyses how projected climatic changes are likely to impact Israel, Palestine, and Jordan's socio-political and economic stability, and thus pose a risk to the country's national, as well as the broader regional security.

Regional Analysis

Research suggests that fragile states are more vulnerable to the impacts of climate change due to their lower adaptive capacity. The Middle East and North Africa region is home to a number of fragile states and has been the showplace of a seismic wave of social uprisings, political repression, and violent conflict. At the time of writing, Syria, Yemen, Iraq, and Libya are all experiencing violent armed conflict, while Jordan, Lebanon, Turkey, and Egypt are grappling with massive migrant waves, and Palestine and Israel have not yet reached a final peace agreement. While none of these conflicts arose solely or primarily out of climatic changes, many of them were amplified by resource mismanagement, lacking social policies to support vulnerable population, and pre-existing intergroup tensions.

Israel, Palestine, and Jordan lie at the heart of the MENA region. The region itself is highly volatile and periodically engages in armed conflict. At the same time, as part of the MENA, these countries are also highly vulnerable to the impact of climate change. Societies behave in a non-linear and complex web of interactions. Correspondingly, the impact of climate-related change is multi-dimensional and interlinks various sectors of society, including the water and food, energy, environmental, public health, and economic sector.

Water and Food Security

Water security is at the front and center of the climate change-security nexus. The reason for this is quite simple: less available water as a result of conflict, resource mismanagement, and lack of good water governance coupled with higher temperatures and less precipitation equates more competition over water resources between sectors and groups of people. The ramifications will be far-reaching across the agricultural, food, health, energy, and economic sectors.

The negative impact of less available freshwater will be most pronounced in the agricultural sector, which consumes the highest amount of water in all three countries. Environmental degradation of agricultural land, water shortages, and more frequent weather extremes will reduce agricultural yields and lead to rising costs of agricultural inputs that will especially hurt small to mid-sized farmers.

In 1994, the Palestinian agricultural sector contributed to 14 percent of Palestine's GDP. Limitations imposed by the Israeli military in areas C of the West Bank combined with consecutive years of draught reduced the significance of the agricultural sector to only 3 percent of the GDP today. Nevertheless, agriculture officially employs almost nine percent

of the Palestinian workforce,[25] and accounts for twenty percent of Palestine's exports.[26] Agriculture further plays an important role as a supplier and consumer of other sectors of the Palestinian economy, such as the food industry, transport, mining, wholesale and retailers[27]. Lower exporting capacity and higher dependence on imported foods will likely result in higher food prices, lower and less stable incomes, and possible food shortages. This will hit subsistence farmers and low-income households the hardest, especially those that rely exclusively on agricultural yield to sustain their livelihoods. In 2018, 31.5 percent of Palestinian households are reported to being moderately to severely food insecure.[28]

In Jordan the agricultural sector has shrunk significantly over the years as well, from contributing 8.3 percent to the GDP in 1994 to merely 3.5 percent in 2016.[29] Due to a changing climate, Jordanian farmers have had to adopt different agricultural practices including less water-intensive and more heat-resistant crops, and increased usage of herbicides and fertilizers. In some parts of Jordan such as the Zarqa River Basin, unsustainable agricultural practices have resulted in extreme groundwater and river pollution, leading to the closure of most of the farms along the river.[30] More frequent droughts and heat waves will have long-lasting effects on Jordan's water and food security (caused by reduced agricultural production and rising food prices), with particularly harmful impacts on Jordanian farmers along the Jordan, Yarmouk, and Zarqa Rivers.[31]

Water and Energy Security

The most prominent answer to less water in the regional climate change discourse is the use of non-conventional water sources such as desalination and treated wastewater. The increased usage of either method requires high amounts of energy, which begs not only the question of cost-efficiency, but also demands a long-term strategy for energy security. Despite its low abundance of domestic fossil resources, Jordan has become a regional trailblazer in the field of renewable energy. The kingdom has worked towards diversifying its energy supply away from coal, oil, and gas and is well on track to meet its goal of supplying 20 percent of its energy supply by 2030 through renewable energy sources such as wind, photovoltaic, concentrated solar power, biomass, and biogas.

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25 The Palestinian government estimates that the number of Palestinians, especially women, working in the agricultural sector unofficially is much higher. See The State of Palestine/Ministry of Agriculture, *National Agricultural Sector Strategy (2017-2022): Resilience and Sustainable Development* (November 2016) 9, http://www.lacs.ps/documentsShow.aspx?ATT_ID=31791.

26 Office of the United Nations Special Coordinator for the Middle East Peace Process (UNSCO), *UNSCO Socio-Economic Report: Overview of the Palestinian Economy in Q2/2017*, (2017) 2, https://unsco.unmissions.org/sites/default/files/unsco_socio-economic_report_q2_2017.pdf; FAO, *Evaluation of FAO's Programme in West Bank and Gaza Strip 2011-2015* (Office of Evaluation, August 2017) 22, http://www.fao.org/3/a-bd698e.pdf.

27 The State of Palestine/Ministry of Agriculture, National Agricultural Sector Strategy, 8.

28 United Nations Office for the Coordinator of Humanitarian Affairs in the Occupied Palestinian Territory (OCHAOPT), *Humanitarian Needs Overview 2018: Occupied Palestinian Territory* (2018) 3, https://www.ochaopt.org/sites/default/files/hno_20_12_2017_final.pdf

29 "Agriculture, forestry, and fishing, value added (% of GDP)." The World Bank. https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS.

30 International Union for Conservation of Nature, *On the Path of Resilience to Climate Change in Jordan* (2012), https://www.iucn.org/sites/dev/files/import/downloads/jordan.pdf.

31 Rajsekhar, Deepthi and Steven Gorelick, "Increasing drought in Jordan: Climate change and cascading Syrian land-use impacts on reducing transboundary flow," *Science Advances* 3 no. 8 (2017): 1-15.

In Palestine, the gap between energy demand and supply is increasingly widening. Gaza's groundwater becomes increasingly saline as the continued over-extraction of aquifers and the rise of the Mediterranean water level leads to the intrusion of seawater. Recent reports suggest that 90 percent of the wells in Gaza fail to meet salinity standards.[32] This steady decline of freshwater is paired with a continuous increase of Gaza's water demand,[33] so that today, almost all households in Gaza are forced to purchase high-cost desalinated water from the private sector.

To ensure sufficient water supply to its people, agriculture and industry, as well as start the slow process of aquifer restoration and stop the over-extraction of groundwater, Palestine's long-term climate change action plan relies heavily on the use of wastewater treatment and desalination.[34] This, however, necessitates sufficient and continuous energy supply, which Gaza currently lacks. Palestine's electricity is mainly supplied by Israel, (Egypt imports a small quantity into Gaza and Jordan into Jericho), with only ten percent produced domestically. Power outages and interruptions in the Gaza Strip (partly as a result of lack of fuel, partly because of lacking operational and maintenance materials) have been a periodic occurrence over the past years and have had devastating consequences for the humanitarian and environmental situation in the Strip.[35] A small-scale desalination plant funded by UNICEF and the EU was inaugurated in January 2017, but was soon running on an ad hoc basis powered by emergency fuel. Even though the plant includes solar panel systems to provide renewable electricity, these will only cover around 12 percent of the required power.[36] Thus, there is still no solution that guarantees sufficient and continuous power supply needed for Palestinian water projects in Gaza.

Socio-economic Development

The effects of climate-related change will impact a wide range of areas, including the agricultural, energy, water, health, and tourism sectors. Resource mismanagement and failed governance obstructs social and economic development, both on an individual as well as on the state level. Lack of economic opportunities is already reflected in the high rate of unemployment among Palestine's youth (60 percent of 15-29 year-olds in Gaza and 39 percent in the West Bank) and Jordanian youth (almost 40 percent of 15-24 year-olds).[37] Reduced agricultural productivity as a result of climate-related change will have a marked effect on Palestine's and Jordan's capacity for social and economic development. The Jordan

32 Zafrir Rinat. "Ninety-seven Percent of Gaza Drinking Water Contaminated by Sewage, Salt, Expert Warns." *Haaretz*, 21 January, 2018.

33 A 2012 UN report suggests that water demand in Gaza would increase by 60 percent by 2020. See *UNRWA, Gaza in 2020: A Livable Place?* (United Nations Country Team in the occupied Palestinian territory, 2012), https://www.unrwa.org/userfiles/file/publications/gaza/Gaza%20in%202020.pdf.

34 Weibel, Catherine. "UNICEF seawater desalination plant helps head off Gaza water crisis." UNICEF, 6 April 2017, https://www.unicef.org/stories/unicef-seawater-desalination-plant-helps-head-gaza-water-crisis.

35 For a detailed analysis of the Gaza Water and Energy Crisis see Gidon Bromberg, Giulia Giordano, Oded Eran, and Omri Elad. *Gaza on the Edge: The Water and Energy Crisis in Gaza.* EcoPeace Middle East and INSS, 2018. http://ecopeaceme.org/wp-content/uploads/2018/05/Gaza-on-the-Edge.-May-2018.pdf.

36 OCHAOPT, "Largest seawater desalination plant opened in Gaza," *The Monthly Humanitarian Bulletin*, March 11, 2017, https://www.ochaopt.org/content/largest-seawater-desalination-plant-opened-gaza.

37 OCHAOPT, *Humanitarian Needs Overview*, 15; The World Bank, Unemployment youth total & of labor force ages 15-24, September 2018, https://data.worldbank.org/indicator/SL.UEM.1524.ZS.

Valley, as the regions bread basket, is a case in point. Less yield from the agricultural sector will produce knock-on effects such as lower income for farmers and higher food prices. Higher production costs for basic resources such as water and energy will drive up consumer prices, which will be particularly harsh for low-income households and other vulnerable groups.

The combination of economic recession and weak social security systems is susceptible to creating a vicious circle of poverty and poor public health. The erosion of livelihoods fosters food insecurity and poor health. At the same time, lower economic capacity often prevents families from seeking medical attention. The result is an overall deterioration of public health, which in turn undermines economic activity and perpetuates poverty.

Implications for National and Regional Security

How does continued conflict, resource mismanagement, and low socio-economic development affect national and regional security? The previous section explored the close connection between poor health and poverty. This section shows how poverty is part of another vicious circle created through a link with violence. The link between poverty and violence is not based on one simple causality. Rather, it is the compounded interplay of different variables and circumstances that causes poverty and violence to symbiotically influence and cultivate each other.

Systemic failure to respond to humanitarian and environmental crises procures dissatisfaction with the governing authorities. Weak democratic structures, low accountability of political elites, corruption, and the marginalization of certain groups further constrain the effectiveness of peaceful forms of resistance. The built-up pressure from within may inadvertently ignite a wave of uprisings and mass riots that will challenge the resilience of the system. The Arab Spring was a conglomeration of such waves, and its effects pervade the Middle East to this day.

The Arab Spring and its far-reaching impact on the political stability of the Middle East has also shown how widespread dissatisfaction and lack of prospects can trigger massive waves of refugees and internally displaced persons (IDPs). Jordan's acceptance of over 1.5 million Syrians, of them 600,000 UN registered refugees,[38] since the onset of the civil war has put the country before new challenges. The overwhelming majority of refugees are settling in urban and rural areas in the north of the kingdom. The rest are concentrated in refugee camps, many of which are suffering from diseases, water and food shortages, and high rates of crime and violenc.[39]

The stark influx of refugees is both straining Jordan's finances, natural resources, as well as the patience of its people. Dwindling water, food, and energy supplies are fueling public discontentment with the governing authorities. In 2018, Jordan experienced mass protests

38 The Jordanian government estimates that the number of unregistered refugees from Syria has driven up this number to more than 1.4 million. See Ministry of Planning and International Cooperation, *Jordan Response Plan for the Syria Crisis 2016-2018*, https://reliefweb.int/sites/reliefweb.int/files/resources/JRP16_18_Document-final+draft.pdf.

39 See Alshoubaki, Wa'ed and Harris, Michael, "The impact of Syrian refugees on Jordan: A framework for analysis," *Journal of International Studies 11* vol. 2, (2018): 154-179; Circle of Blue: "Water Closely Linked to World's Refugee Crisis," February 2018, https://www.circleofblue.org/2018/world/water-closely-linked-worlds-refugee-crisis/; See also Nimer, Nabil A., A Review of Emerging and Reemerging of Infectious Diseases in Jordan: The Aftermath of the Syrian Crisis, *Canadian Journal of Infectious Diseases and Medical Microbiology,* May 2018, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5994294/.

of unprecedented numbers against the kingdom's raised fuel and electricity prices that were put in place to strengthen Jordan's fragile economy.[40] Reports indicate that a large part of Syrian refugees have no intention of going back to their home country.[41] In the long run, this will mean that Jordan's population will face increasing water and energy demand, in addition to competition over arable land between refugee and host country farmers.

From a national security perspective, both Israel and Palestine have a vested interest in seeing Jordan as a stable neighbor. With almost every family in Palestine having relatives in Jordan, the destabilization of Jordan would have tremendous ramifications for the Palestinian population as well. At the same time, as the second of only two Middle Eastern 'peace partners' and neighbor with whom Israel shares its longest border, Jordan is an important ally for Israel and its internal stability is pivotal for the region's balance and therefore Israel's national security. Thus, it is in both Palestine and Israel's strategic interest to avert any political disintegration and safeguard Jordan's integrity. To do so, Israel must act to help alleviate Jordan's water crisis, support its development, and together with Jordan devise effective strategies for long-term regional climate security. Reports indicate that Israel has, at times, increased its sale of water to Jordan for the benefit of Syrian refugees, perhaps beginning to understand that water supply to refugees is critical to Jordan's stability and therefore Israel's national security.[42]

On the other side of the Jordan River, Israel's control, especially in Area C, severely limits the scope of actions that can unilaterally be implemented by Palestinian policy-makers, which further adds to the feeling of stagnation. The majority of water and energy infrastructure projects in the West Bank are contingent on the approval of the Israeli Civil Administration. Similarly, improving the humanitarian situation in Gaza requires coordinating with the de-facto governing authority of Hamas. Almost every domestic policy issue in Palestine (and to some degree in Israel) is linked to the failure to resolve the broader Israeli-Palestinian conflict.

The result is a highly inflammable situation, in which dissatisfaction with the governing authorities and the status quo easily transmute into uprisings and mass riots that transcend national borders and threaten Israel and Palestine's national security. A lack of a better future perspective is especially high among people in Gaza but well noted throughout the West Bank too. The combination of Hamas' failed governance and Israel's policy of closure has led to mass unemployment, especially among Gaza's youth. The already detrimental situation in Gaza and military control in the West Bank coupled with the impact of climate change paints an even broader bleak picture, in which economic stagnation and humanitarian misery will lead to the erosion of further livelihoods. Together, this will create less confidence in a peaceful political solution and will bring more faith in traditional means of resistance leading into further episodes of violent confrontations.

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40 Jordan Times, "King freezes price hikes on fuel and electricity," June 1, 2018, http://www.jordantimes.com/news/local/king-freezes-price-hikes-fuel-and-electricity; French Press Agency, "Jordanians protest price hikes, income tax draft law for 3rd day," June 3, 2018, https://www.dailysabah.com/mideast/2018/06/03/jordanians-protest-price-hikes-income-tax-draft-law-for-3rd-day; Associated Press, "Protests against fuel and electricity hikes," June 1, 2018, https://arab24.com/portal/index.php/component/k2/item/10524-2018-06-01-14-57-15.

41 Jordan Times, "Only 18.8 per cent of Syrian refugees want to go home soon," *The Jordan Times*, September 6, 2018. http://www.jordantimes.com/news/local/'only-188-cent-syrian-refugees-want-go-home-soon'.

42 Oded Eran, "Needed: An Israeli Strategy on Jordan", *The Jerusalem Post,* December 1, 2017.

PART III: CLIMATE CHANGE ADAPTATION AND MITIGATION POLICIES

Climate Change Policies

In 2016, Israel, Palestine, and Jordan signed and ratified the Paris Agreement negotiated between the 197 members of the United Nations Framework Convention on Climate Change (UNFCCC). As non-Annex I countries, Israel, Palestine, and Jordan committed to the Agreement's agenda of keeping global temperatures below 2°C, limiting the amount of greenhouse gases emitted by human activity, and regularly reviewing each countries contribution to such.

The global response to climate change has largely followed two approaches. On the one hand, the signatories to the Paris Agreement are committed to climate change mitigation, mostly by reducing carbon emissions. On the other hand, limited achievements in the area of mitigation have shifted the focus towards climate adaptation. This approach is based on the understanding that climate change is no longer a preventable scenario of the future, but is already having an observable impact on our environment. Thus, in addition to measures of mitigation, the global community is also devising strategies with which to adapt to the impacts of climate change.[43]

Each party to the UNFCCC is obligated to submit regular status updates in the form of so-called National Communications and Biennial (Update) Reports. Such reports involve international consultations and analyses and offer assessments of each country's vulnerability to the effects of climate change and a comprehensive strategic plan for implementing national adaptation and mitigation measures.

Jordan

Although Jordan's CO2 emissions are low in absolute terms (32.4 million tons in 2014),[44] the country's growing industrial sector and socio-economic development are expected to drive up GHG emissions over the next years. By signing the Paris Agreement, Jordan agreed to limit carbon emissions by 14 percent as compared to a business-as-usual scenario by 2030. Of those 14 percent, 1.5 percent will be provided by the Kingdom unconditionally, while the remaining 12.5 percent depend on international support.[45] Through the implementation of mitigation and adaptation measures, Jordan seeks to "achieve a pro-active, climate risk-

43 Alterman, Owen, "Climate Change and Security: An Israeli Perspective," *The Institute for National Security Studies*, July 2015.

44 See Climate Watch, "Jordan", 2017, https://www.climatewatchdata.org/countries/JOR.

45 Hashemite Kingdom of Jordan, *Intended Nationally Determined Contribution* (INDC), (2015) 1, https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Jordan%20First/Jordan%20INDCs%20Final.pdf

resilient Jordan, to remain with a low carbon but growing economy, with healthy, sustainable, resilient communities, sustainable water and agricultural resources, and thriving and productive ecosystems in the path towards sustainable development."[46]

The main ministry responsible for climate change policies in Jordan is the Ministry of Environment (MoEnv) and its Climate Change Directorate (CCD) created in 2014. The ministry's responsibility is to reach out to stakeholders to develop climate response actions and incorporate the resulting policies into the decision-making process on the executive level.[47] The ministry operates under the mandate of the Environment Protection Law passed in 2006. The law does not, however, refer specifically to climate change and its effects on the country.[48] In 2001, Jordan formed a National Committee on Climate Change, whose task is to oversee the Partnership for Market Readiness, several ministries of the Jordanian government, funding agencies, NGOs, and private industries.

In 2013, the Jordanian government approved of a National Climate Change Policy for the years 2013-2020, which provides a comprehensive overview of Jordan's vulnerable sectors and the proposed mitigation and adaptation measures to be implemented over the next years.[49] According to the Ministry of Environment, the objective of the policy is to "build the adaptive capacity of communities and institutions in Jordan, with consideration for gender and addressing the needs of vulnerable groups, to increase the resilience of natural ecosystems and water as well as agricultural resources to climate change, and to optimize mitigation opportunities."[50] The government is taking steps to implement sector-specific targets, for example in the field of renewable energy sources and energy efficiency,[51] water and wastewater treatment,[52] and land-use and desertification.[53]

The government's most recently published documents on climate change are *Jordan's 2025 Vision and Strategy* (2015) and the *National Green Growth Plan* (NGGP) (2017). *2025 Vision and Strategy* includes a list of adaptation measures for the environmental, food, agricultural, water, and energy sectors, and is implemented through a three-year Executive Development Program (EDP).[54] The NGGP is a reference guide for green growth projects and green policies

46 Ministry of Environment, *The National Climate Change Policy of the Hashemite Kingdom of Jordan 2013-202*0, 8.

47 See Andrea Rizzo, *Transparency of Climate Action in the ENPI South Region* (ClimaSouth Project, 2016), http://www.climasouth.eu/sites/default/files/policy_paper/CS_policy_paper_N1_pagsing.pdf.

48 Ministry of Environment, *The National Climate Change Policy of the Hashemite Kingdom of Jordan 2013-2020* referring to Environment Protection Law No. 56 (2006).

49 Ministry of Environment, *The National Climate Change Policy of the Hashemite Kingdom of Jordan 2013-2020.*

50 Ministry of Environment, *The National Climate Change Policy of the Hashemite Kingdom of Jordan 2013-2020.*

51 In 2012, the GoJ passed the Renewable Energy & Energy Efficiency Law, which foresees investments in renewable energy projects in the private sector. It was established along with the Jordan Renewable Energy and Energy Efficiency Fund. Despite being an important law on the path towards reducing GHG, only one of the articles (Article 3(b) refers directly to climate change. See Ministry of Environment, *The National Climate Change Policy of the Hashemite Kingdom of Jordan 2013-2020.*

52 With "Water for Life", the GoJ developed a comprehensive water strategy for the years of 2008 and 2022. See Ministry of Environment, *The National Climate Change Policy of the Hashemite Kingdom of Jordan 2013-2020.*

53 For example, through the National Action Program to Combat Desertification.

54 See Intersectoral Coordination for the Implementation of the Climate Change Policy of the Jordanian Environment Ministry (GF – ICE) Climate Change Governance in Jordan: Towards Policy and Institutional Coordination, Amman October 2015.

and includes a cost-benefit analysis for 24 green growth projects in Jordan.[55]

According to *2025 Vision and Strategy*, the development of a legislative framework for the organization of climate change to maximize the benefits, minimize the negative impacts, and build national capacity was stated as a priority initiative. Strengthening the line ministries' engagement with climate change-related risks and opportunities can be seen under the resource security and management scenarios (water, energy, food and agriculture). However, these initiatives were not explicitly targeted at responding to climate change impacts. Nevertheless, they constitute significant entry points for mitigation and adaptation initiatives.

The Government of Jordan expects the National Adaptation Plan (NAP) to be validated in January 2019. The approach adopted for developing NAP includes:

- Supporting a coordination structure for stakeholder engagement
- Tailoring and applying a methodology to integrate adaptation into two selected pilot sectors and budgeting processes,
- Providing capacity building for a NAP process in Jordan and
- Establishing the baselines for drafting a NAP document, and setting up and M&E Framework

The NAP process is linked to the implementation of the NDC adaptation goals by providing a detailed stocktaking of progress in implementation, prioritization of adaptation goals, developing sustainable reporting mechanism on adaptation actions and focusing on adaptation with mitigation co-benefits. Therefore, the NAP prepared a number of practical steps that can be taken to become better prepared for climate change and its impacts.

A comparison, however, of Jordan's climate change projections with its National Water Strategy for 2016-2025 unveils several major inconsistencies. While Jordan's National Communications as well as 2025 Vision and Strategy project a steady decline of available freshwater levels (due to rising temperatures, less rainfall, and increased evapotranspiration), such a decline is not reflected in the country's national water strategy. Rather, the National Water Strategy seems to suggest a constant level of groundwater safe yield up to 2025. At the same time, the total amount of water supplied is projected to increase through the use of alternative sources, such as non-renewable groundwater, increased surface water, more supply from treated wastewater, and through large-scale desalination.

Among these options, treating wastewater has the largest potential to increase Jordan's water supply in the near future and supply large portions of the kingdom's industry and agriculture (the latter consumes over half of the country's water supply). At this point, the full

55 Jordanian Ministry of Environment, A National Green Growth Plan for Jordan (Amman: Hashemite Kingdom of Jordan, 2017), http://www.moenv.gov.jo/AR/Documents/report2017/الخطة%20الوطنية%20للنمو%20الأخضر.pdf.

implementation of this plan is, however, obstructed by Jordan's low tariff policy for natural freshwater, which ultimately disincentivizes the increased use of treated wastewater.

Much of Jordan's climate change response is dedicated to large-scale desalination, including the use of desalination of brackish water in the Jordan Rift Valley area and Badia, as well as the proposed regional conveyance project between the Red and Dead Sea.[56] According to the Jordanian National Water Strategy, "by 2025, water demand will exceed the available water resources by more than 26% and this deficit is projected to be improved to 6% when the Red Sea-Dead Sea Project goes online."[57] At this stage, however, the Red Sea-Dead Sea (RSDS) Project is heavily delayed by regional political hurdles, so that its envisioned completion by 2025 remains unlikely.[58] This leaves Jordan increasingly water insecure, with national and regional security implications.

Palestine

In March 2016, Palestine became the 197th member to the UN Climate Change Convention. After signing and ratifying the Paris Agreement, Palestine committed to the Agreement's agenda of limiting GHG emissions and adapting to the impacts of climate change. According to an estimate by the UNFCCC from 2011, Palestine's total GHG emissions amounted to 3.3 million tons.[59] Palestine has presented two GHG reduction scenarios. The first scenario is based on the continuation of the political status quo and projects a 12.8 percent GHG reduction by 2040. [60]The second scenario is contingent on a political solution to the Israeli-Palestinian conflict, in which case the country projects a reduction of its GHG emissions by 24.4 percent by 2040. Palestine has not yet submitted any Biennial Update Reports (BURs) but has finished its initial national communication report and has presented its National Adaptation Plan (NAP) to the UNFCCC.

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56 In 2001, the two governments announced that Jordan and Israel had agreed to hold a joint set of studies on the Red Sea-Dead Sea Project (RSDS). After many years of delay, plans were formalized in 2013 resulting in an agreement on a pilot RSDS, or water exchange, signed in Washington, D.C. by Israel, Jordan and the Palestinian Authority. The agreement foresees the construction of a desalination facility in Aqaba, which would produce up to 80 mcm/y of desalinated Red Sea water. Thirty (30) mcm/y of the water produced would be supplied to Aqaba and 50 mcm/y would be sold to Israel for use in the Eilat and Arava areas. In exchange, Israel committed to sell 50 mcm/y of water from the Sea of Galilee to Jordan, in addition to the 55 mcm supplied as part of the Peace Treaty. The price of the water that will be sold from Jordan to Israel in the Arava will be equivalent to the cost of desalination at the Red Sea together with brine disposal at the Dead Sea. Though the marginal cost of water in Israel is desalinated water, with a range from 3.0-3.5 NIS per cubic meter, the price of the water sold to Jordan under this new water swap deal will be lower than the marginal cost of water in Israel.36 According to press reports, the 50 mcm/y to be sold to Jordan in this new deal will be at the price of approximately $0.40 per cubic meter (1.5 NIS per cubic meter).

57 Jordanian Ministry of Water & Irrigation, National Water Strategy 2016-2025, (2016), 10, http://www.mwi.gov.jo/sites/en-us/Hot%20Issues/Strategic%20Documents%20of%20%20The%20Water%20Sector/National%20Water%20Strategy(%202016-2025)-25.2.2016.pdf

58 According to the National Water Strategy, the first phase of the Red-Dead Conveyance Project was intended to be implemented between 2017 and 2021. The second phase is planned for 2020 to 2025. See Jordan National Water Strategy, p. 27).

59 Climate Watch, "Palestine", https://www.climatewatchdata.org/countries/PSE?source=33.

60 State of Palestine, *Nationally Determined Contributions (PNDC)/United Nations Framework Convention on Climate Change (UNFCCC),* (2017),

The Palestinian Environmental Quality Authority (EQA) chairs the National Committee for Climate Change composed of 27 different stakeholders. The EQA collects information and data concerning climate variability and oversees the implementation of the NAP. To oversee and coordinate the actions of these ministries, the Palestinian National Authority (PNA) created a Capacity Development Program (CDP), which is also tasked with assessing the country's national capacities for implementing various mitigation and adaptation measures.[61]

The National Adaptation Plan (NAP) addresses the country's most vulnerable sectors, outlines future climate scenarios, and proposes response actions to mitigate and adapt to the impact of climate change.[62] Adaptation measures range from no-regrets to low-regrets actions and mostly foresee near-future actions intended to address particularly vulnerable sectors of the Palestinian state.[63] The plan further presents several response actions to be implemented in case of an Israeli-Palestinian peace agreement.[64]

Many of Palestine's climate change response actions are contingent on a political solution to the Israeli-Palestinian conflict, that includes the definition of Palestinian water rights.[65] Israeli and Palestinian leadership should take into account that the failure to resolve the Israeli-Palestinian conflict impedes Palestine's capacity to lessen and adapt to the impacts of climate change with national security implications for both the Palestinian and the Israeli governments. The repercussions of climate change further destabilize the socio-economic situation in the West Bank. Thus, national security advisers on both sides should call on their political leadership to find the needed political solutions, with a priority on water issues as the lowest hanging fruit.

Unlike the NAP or Palestine's National Communications to the UNFCCC, the National Water and Wastewater Policy and Strategy for Palestine (2013) dedicates very little space to the impact of climate change on water resources.[66] While projections for the Gaza Strip show a steady decline in available groundwater over the years, this is not reflected in the forecasts for the West Bank. Rather, the document outlines a 40 percent increase of available freshwater by 2032, as well as increased water storage capacity and yield from West Bank boreholes and springs as a result of Israeli recognition and definition of Palestinian water rights. The updated Water Sector Strategy for 2016 – 2018 sets the goal of developing and protecting water resources based on principles of integrated management. The strategy dedicates a program

61 Andrea, Rizzo, *Transparency of Climate Action in the ENPI South Region.*

62 ibid

63 For more information on the adaptation measures see UNDP, *Climate Change Adaptation Strategy and Programme of Action for the Palestinian Authority* (Final Report of Consultants to the UNDP/PAPP initiative, December 2009), http://eprints.lse.ac.uk/30777/1/PA-UNDP_climate_change.pdf.

64 See PNDC.

65 Since Oslo II, Israel has recognized Palestinian water rights, but the exact definition of such was postponed until a final peace deal is reached. Meanwhile, the Palestinians have access to the aquifers underlying the West Bank and the Gaza Strip, but remain excluded entirely from the water resources of the Jordan River.

66 Palestinian Water Authority. *National Water and Wastewater Policy and Strategy for Palestine: Toward Building a Palestinian State from Water Perspective* (2013) http://www.pwa.ps/userfiles/server/استراتجيات/Eng/Water20%Strategy20%English20%Final.pdf

on developing alternative water resources including desalination, wastewater reuse, as well as climate change projects, with no clear definition of these projects or referencing to the NAP.[67]

In Gaza, much of the higher amounts of water estimated to be available by 2032 can be ascribed to a 96 percent increase in the use of desalination and a 20 percent reduction of Unaccounted For Water (UFW).[68] While desalination is undoubtedly a viable option to alleviate the water stress of Gaza's people and industry, the full implementation of large-scale desalination in the Strip is also primarily contingent on broader political factors.

Israel

In 2014, Israel emitted 87.4 million tons of CO_2, making up 0.2 percent of emissions world wide.[69] Israel's commitment to lowering global GHG emissions was consolidated in 2016, when the country adopted and ratified the Paris Agreement. As part of its responsibilities to the UNFCCC, Israel has submitted two National Communications (NCs) and a BUR, as well as a plan for the implementation of the Paris Agreement.[70] As of now, Israel has not submitted any Nationally Appropriate Mitigation Actions (NAMAs) to the NAMA Registry.

On the national level, Israel's lead ministry on issues related to climate change is the Ministry of Environmental Protection. In 2006, the Ministry set up an inter-ministerial steering and monitoring committee, whose objective is to devise strategies for preparing for, adapting to, and protecting against the impact of climate change. It also assesses the progress made on the implementation of government policies related to the reduction of GHG and energy efficiency.[71]

Prior to the Paris Agreement, Israel declared its goal of limiting per capita GHG emissions to 26 percent below the 2005 levels by 2030, with an interim target in 2025.[72] The country intends to reach this goal by reducing electricity consumption by 17 percent coupled with a 17 percent increase in electricity generated from renewable sources, and a 20 percent reduction of the use of private transportation.[73]

In 2011, the Ministry of Environmental Protection helped establish the Israel Climate Change Information Center (ICCIC) at Haifa University. The center explored the main

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67 Palestinian Water Authority/State of Palestine, *Water Authority Strategic Plan 2016-2018*, http://pwa.ps/userfiles/server/%D8%A7%D8%B3%D8%AA%D8%B1%D8%A7%D8%AA%D8%AC%D9%8A%D8%A7%D8%AA/Eng/Water%20Sector%20Strategic%20Plan%202016-2018%20Eng.pdf.

68 Palestinian Water Authority. *National Water and Wastewater Policy and Strategy for Palestine*,96.

69 Climate Watch, "Israel", https://www.climatewatchdata.org/countries/ISR.

70 See Israel Ministry of Environmental Protection, Israel *National Plan for Implementation of the Paris Agreement*, (September 2016), http://www.sviva.gov.il/InfoServices/ReservoirInfo/DocLib2/Publications/P0801-P0900/P0836eng.pdf.

71 Andrea, Rizzo. *Transparency of Climate Action in the ENPI South Region.*

72 See Israel Ministry of Environmental Protection, *Israel National Plan*

73 See Environment and Health Fund and Ministry of Health, *Environmental Health in Israel* 2017, (2017), 98, https://www.health.gov.il/PublicationsFiles/BSV_sviva2017_EN.pdf. It should be noted, however, that the Israeli Central Bureau of Statistics reported a 5.6 percent increase in the number of private cars purchased in Israel in 2016.

predictions on the effects of climate change in Israel and, for the first time, identified climate change and national and regional security issues as priority issues to consider.[74] In its last report, the ICCIC identified thirty-one coping strategies for Israel's water sector, ranging from no-regret to high-regret measures, including geostrategic issues associated with Israel's neighbors.[75] Due to lack of funding and prioritization, however, the Center was closed in 2014.

Israel plans to implement adaptation and mitigation policies in the water, health, environmental, transportation, construction, and economic sector. The policies are sorted according to low-regrets and no-regrets measures as well as high, medium, and low priorities.[76] Most recently, the Israeli government adopted a *National Adaptation Plan* (NAP), which offers recommendations for future adaptation measures and identifies existing knowledge and research gaps.[77]

In addition to its climate change response plan, Israel also published a long-term master plan that outlines strategies for the water sector up to the year 2050. The master plan records a steady decline in freshwater, parallel to a stark increase of water generated through the use of desalination, leading to a higher freshwater production overall.

The increased usage of desalination and reuse of treated wastewater will remain an important dimension of Israel's water strategy in the future. To supply manufactured water across the entire country, however, Israel will have to develop its water infrastructure from reaching not only demand located along its Mediterranean coast, but also the peripheral areas in the far north and south.[78]

Meanwhile, Israel's development of renewable energy sources is poorly advanced to meet its envisioned goal of supplying 17 percent of its energy needs through renewable sources by 2030. Presently, only around 2.6 percent of Israel's electricity comes from renewable sources, including solar, wind, and biogas.[79] Instead, the country is banking on its relatively high abundance of natural gas. This, however, is both a finite and thus unsustainable resource, as well as yet another emitter of greenhouse gas and thus counterproductive to Israel's commitment to lowering its CO2 levels. However, because much of Israel's open space is

74 See Israel Ministry of Environmental Protection, Israeli Climate Change Information Center, http://www.sviva.gov.il/English/env_topics/climatechange/Adaptation/Pages/ClimateChangeInformationCenter.aspx. See also Manfred S Green, Noemie Groag Pri-or, Guedi Capeluto, Yoram Epstein and Shlomit Paz, Climate change and health in Israel: adaptation policies for extreme weather events, Israel Journal of *Health Policy Research*, 2:23, June 2013.

75 See State of Israel, Ministry of Environmental Protection, Office of the Chief Scientist, "Adaptation to climate change in Israel: recommendations and knowledge gaps", February 2014, http://www.sviva.gov.il/infoservices/reservoirinfo/doclib2/publications/p0701-p0800/p0739.pdf

76 ibid.

77 See Environment and Health Fund and Ministry of Health, *Environmental Health in Israel in 2017*, 98.

78 According to Caspi-Oron director of the water department at the Israel Union for Environmental Defense, cited in "Drought Raises Questions About Israel's Water Strategy", Voa News, August 4, 2018, https://www.voanews.com/a/drought-raises-questions-about-israel-s-water-strategy/4514246.html

79 Staff, T., "On a cloudless day, Israel breaks its solar power production record", The Times of Israel, March 19, 2018, https://www.timesofisrael.com/on-a-cloudless-day-israel-breaks-its-solar-power-production-record/.

either designated as nature reserves or military bases, the country has limited capacity to develop large-scale solar energy fields.

Lastly, although a large portion of Israel's natural freshwater water sources stem from transboundary water basins, very little of Israel's Water Strategy speaks to a regional water management approach. Rather, one of the plan's main recommendations is to "separat[e] the Israeli Authority and the Palestinian Authority's water supply systems as much as possible."[80] Official reports further state that negotiations with Jordan are limited to the Red-Dead Sea Conveyance Project and the rehabilitation of the Lower Jordan River.[81]

Bilateral Agreements

Israel-Jordan Water Agreements

Water relations between Jordan and Israel were formalized and institutionalized by the 'Treaty of Peace between the State of Israel and the Hashemite Kingdom of Jordan' signed in 1994. The treaty contains a water-sharing provision that aims to achieve a 'comprehensive and lasting settlement of all the water problems' between the two countries through mutual recognition of their 'rightful allocations' to water from the Jordan River, the Yarmouk River and the Arava groundwater.[82] The agreement also established a coordinated water management body, the Joint Water Committee, responsible for implementing the water provision and resolving water- related matters that may arise subsequently.

Reputed to be 'one of the most creative water treaties on record,' the agreement had both countries using the Sea of Galilee (Tiberius) as a shared water reservoir with Israel 'storing' winter water from the Yarmouk River pumped to the Sea of Galilee for later summer transfer to Jordan, with the evaporation loss incurred at Israel's expense.[83] With climate change causing a dramatic reduction of water availability in the upper Jordan Basin catchment area as well as the Sea of Galilee, the viability of the lake as a fresh water body is increasingly at risk. Though water issues have historically been a source of robust cooperation, rising political differences between the two countries and the failure to advance agreed water projects such as the RSDS have led to considerable political tension.

Israel-Palestine Water Agreements

In 1995, the Israeli-Palestinian Interim Agreement on the West Bank and the Gaza Strip, also known as Oslo II, was signed. Article 40 of Annex III and the related Schedules 8–11 of

80 State of Israel/Water Authority, *Long-term Master Plan for the National Water Sector: Part A – Policy Document, Version 4,* (2012), 35, http://www.water.gov.il/Hebrew/Planning-and-Development/Planning/MasterPlan/DocLib4/MasterPlan-en-v.4.pdf.

81 State of Israel/Water Authority, *National Water Strategy*, 40.

82 "Article 6, - Water," Israel-Jordan Peace Treaty (1994), http://www.kinghussein.gov.jo/peacetreaty.html.

83 Arnon Medzini and Aaron T – Wolf, "Towards a Middle East at Peace: Hidden Issues in Arab-Israeli Hydropolitics," *Water Resources Development*, 20, no. 2, (June 2004), 193-204

the agreement contain provisions related to the allocation of water between Israel and the Palestinian Authority, with major focus on the Mountain Aquifer, the mutual obligation to treat or reuse wastewater, and the establishment of a coordinated water management body, the Joint Water Committee (JWC). Responsibility for the management of Palestinian water infrastructure and services for the Palestinian population in Areas A and B was transferred to the Palestinian Water Authority.

Despite its interim purpose, today, more than two decades after the agreement was signed, water issues between Israel and Palestine are still regulated under Article 40. The Oslo Agreement is ambiguous with regard to the provision of additional water as per the 'future needs' and fails to take into account demographic and climate-related changes. Since the 1990s, the Palestinian population has almost doubled, while changes in lifestyle largely due to socio-economic development have further driven up water demand. At the same time, however, the water available to the Palestinians has steadily diminished.

The Joint Water Committee (JWC) is vested with jurisdiction regarding the allocation of water between Israel and Palestine, concerning all water and sanitation projects in the West Bank. The operations of the JWC and the requirement of a second layer of permission from the Israeli Civil Administration for Palestinian projects in Area C have hindered progress for large scale Palestinian water infrastructure. For over seven years, the JWC had not officially met due to the Palestinian Authority's refusal to approve Israeli water projects for settlements. This impasse left a backlog of reportedly one hundred projects awaiting approval. In January 2017, Israeli and Palestinian officials announced the revival of the JWC on a different basis. Under the new arrangement the allocation of shared natural water remains unchanged and Israeli Civil Administration approval is still needed for Palestinian projects in Area C, which covers 60 percent of the West Bank. Nevertheless, this new arrangement reflects loosening of Israeli control to some degree, allowing Palestinian infrastructure projects in Area A and B to advance without seeking approval from the JWC. In addition, the two parties agreed to double the amount of water sold to Gaza and an additional 23 mcm/y water sale to the West Bank.

Regional Cooperation

The implications of not moving beyond the agreements and regulations set forth in the Israel-Jordan Peace Agreement and Oslo II can already be witnessed today, and they will be augmented by the impact of climate change. The repercussions of climate change will be felt on multiple dimensions – from global outcomes to national, regional, and local reverberations. It is only logical that an approach to mitigating and adapting to climate change be multi-dimensional, incorporating a clear strategy for all players in the region.

To do so, Jordan, Palestine, and Israel should abandon their view of climate change, water, and energy security as a zero-sum game, and instead embrace the real possibility of a win-win solution. Water diplomacy should no longer be held hostage to a comprehensive peace deal that may or may not transpire in the near future. Rather, for the purpose of changing the competitive situation into a cooperative state of co-existence and collaboration, the three

countries need to pay attention to the region's shared water needs, threats, and interests that lie ahead. The alignment of needs and interests could start by challenging the differences between national discourses on water and climate change security. The narrative depiction of water resources as naturally scarce and vulnerable but essential for all inhabitants of the region in combination with the identification of regional water interdependencies, self-interests, and mutual gains could serve to overcome the objection against discourses along national lines.[84]

Climate change has long been described as a threat multiplier, intensifying pre-existing vulnerabilities and inter-group tensions. As Ms. Sherri Goodman, Senior Advisor for International Security at the Center for Climate and Security and Senior Fellow at the Woodrow Wilson International Center explained, climate change should not only be perceived as a threat multiplier, but also as a multiplier of opportunities. As well as designing measures for the effective management of the region's natural resources, cross-border environmental cooperation further offers the unique opportunity to establish a platform for dialogue and trust among regional players. A rare occurrence in the conflict-ridden Middle East, concerted efforts to combat the threats of climate change will be one step of in a cycle of positive interactions that builds trust.[85]

One such example is the EcoPeace / Konrad Adenauer Foundation initiative for the exchange of manufactured water from the Mediterranean Sea with renewable energy from Jordan's vast deserts. The Water Energy Nexus (WEN) project details a regional approach to counter the effects of climate change and its potential negative security implications, while providing solutions to water and energy security in the region.[86]

To advance the WEN project, a pre-feasibility study was completed. The pre-feasibility study shows that the water-energy exchanges foreseen between Jordan, Palestine, and Israel are technically feasible and potentially offer substantial economic, environmental and geo-political benefits to each of the parties.

From a national and regional security perspective, the project would generate a number of geo-political benefits for each side that are congruent with the benefits outlined in Table 2. Many of those benefits are in line with primary policy goals of the various nations. For Jordan, this includes increasing energy security and lowering the cost of supplying water. For Palestine, it would mean reducing its dependence on Israel for basic resources and integrating its infrastructure into the Arab world. For Israel, the project is in line with its declared goal of promoting cooperation via economic development and pursuing political arrangements vis-à-vis its neighbors in a regional framework.

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84 Ide, T; Fröhlich C. (2015): *Socio-environmental cooperation and conflict? A discursive understanding and its application to the case of Israel and Palestine*. Earth System Dynamics, 6. 666; See also Hussein H., "An analysis of the discourse of water scarcity and hydropolitical dynamics in the case of Jordan", 2016, https://ueaeprints.uea.ac.uk/63066/1/Hussam_Hussein_Thesis_Final_version.pdf.

85 Ms. Sherri Goodman at a regional conference on regional climate change issues and their implications for national and regional security held by EcoPeace on November 12-13, 2018.

86 EcoPeace and Konrad-Adenauer-Stiftung, *Water Energy Nexus: A Pre-Feasibility Study for Mid-East Water-Renewable Energy Exchanges* (Executive Summary, November 2017), http://ecopeaceme.org/wp-content/uploads/2018/01/WEN_EXECUTIVE_SUMMARY_FINAL.pdf.

Table 2: Tangible and Intangible Benefits of Cross-Border Environmental Cooperation on Water and Energy

	Environmental/ Humanitarian	Economic	Geo-Political
Jordan	- Eliminating the practice for over-extraction and starting the process of rehabilitation of water resources - Reducing CO2 emissions and air pollution by expanding renewable energy sector	- Reducing cost-revenue gap by receiving a reduced cost of water delivery, decreasing energy imports, and generating revenue from selling renewable energy to Israel and Palestine - Increasing international financial support	- Strong relations with Israel will be the basis for re-negotiating water agreements and assistance for Jordan as a host of large numbers of refugees
Palestine	- Alleviating the environmental and humanitarian situation in the Gaza Strip - Eliminating the practice for over-extraction and starting the process of rehabilitation of water resources - Ensuring long-term renewable energy supply to meet the needs of desalination and water treatment plans and CO2 emissions target - Reducing pressure on open spaces	- Reducing the cost-revenue gap and decreasing water and energy dependence on Israel by managing water resources more effectively, decreasing energy imports, and generating freshwater (and possibly renewable energy resources) in the Gaza Strip - Advancing economic and human development through regional water, infrastructure, and energy cooperation - Increasing international financial support	- Strengthening diplomatic ties with Israel and Jordan may serve as a stepping stone for other cross-border linkages and peace talks - Improving water and energy management will fortify the Palestinian position in future re-negotiations on water and energy agreements and reallocation of water rights
Israel	- Eliminating the practice for over-extraction and starting the process of rehabilitation of water resources - Eliminating public health and water security risks as Palestine receives enough freshwater and electricity to treat wastewater - Ensuring long-term renewable energy supply to meet the needs of desalination and water treatment plans and CO2 emissions target - Reducing pressure on open spaces	- Lowering regulatory hurdles for reducing emissions - Increasing income from selling desalinated water - Benefiting from international financial support	- Reducing national security risks stemming from political instability in the Palestinian Territories (particularly the Gaza Strip) as a result of a severe humanitarian crisis and increased radicalization - Ensuring and strengthening diplomatic ties with Jordan as a regulator of regional balance and peace - Improving diplomatic relations with Palestine and creating inter-sectoral linkages that will establish a basis of trust and a lifeline of communication in the event of renewed violence
All	- Reducing national security risks stemming from water, food, and energy insecurity - Ensuring political and economic stability through the steady and safe supply of water and energy - Safeguarding vital regional water resources for the implementation of each country's climate change adaptation plan		

PART IV: OUTCOMES AND POLICY RECOMMENDATIONS

The analysis of climate change implications for the Middle East has shown that the region is in dire need of a holistic, multi-dimensional approach to climate security, integrating national and regional measures. The leadership of all three countries needs to embrace a paradigm shift away from viewing climate security and water diplomacy as a zero-sum game and towards a real possibility for a tangible, mutually beneficial outcome that can not only strengthen the region's climate resilience, but also comes with an invaluable peace dividend.

In November of 2018, EcoPeace Middle East held a conference on regional climate change issues and their implications for national and regional security with a great variety of stakeholders from Israel, Palestine, and Jordan, as well as experts from the international community. The general outcome of this conference echoes the call for a regional approach to tackle climate mitigation and adaptation measures in order to secure regional water security and the national security interests of all three countries.

Influenced by the national level and regional dialogues held, EcoPeace proposes the following policy recommendations.

1. Promoting a Paradigm Shift to Include Climate Change on the Security Agenda

The connection between climate change and national security has been widely recognized by governments and international organizations around the world. Many countries, including the United States, the United Kingdom, and Germany regard the impact of climate change as an elemental threat to their national security. The recognition of climate-related changes as an inherent part of any national policy is further aligned with international environmental law and the principle of integration. Based on this understanding, "in order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it."[87]

While the control over and access to water resources has long been a subject of national security in Jordan, Palestine, and Israel, little attention is paid to the inherent connection between climate change, regional water insecurity and national security. The analysis presented in this paper has demonstrated that climate change has far-reaching implications for the water and energy sector, economic development, as well as the political stability of the region. Therefore, it is in the national security interest of all three countries to develop an effective strategy led by the highest-level national security directorates and authorities

87 United Nations General Assembly, *Report of the United Nations Conference on Environment and Development* (Rio de Janeiro, 3-14 June 1992) Principle 4, http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm.

in each country. To do so requires Jordan, Palestine, and Israel to embrace a paradigm shift to recognize water security as a fundamental tool for achieving a greater sense of human security. Since water is central for granting access to food, maintaining health and hygiene, sustaining human livelihoods, and economic growth, it is vital to recognize the impact of climate change on water security as an inherent threat to national security as well as the region's stability.

In that sense, EcoPeace does not encourage the securitization of climate or water issues, which would narrow the range of negotiations and valuable opportunities for action. Rather, EcoPeace promotes the view that climate and water issues must be indeed regarded as a fundamental part of national security, but from a regional human security perspective. Climate and water security are seen as essential for the wellbeing and internal stability of a state, therefore for its national security. Its deterioration can have repercussions not only on its internal dynamics, but also on neighboring countries, as in the case of pandemic disease, mass migration, and radicalization. States must therefore recognize the fundamental role that climate and water security plays in determining their own development and that of their neighbors'.[88]

The message that climate security is a national security issue needs to reach not only the leadership, but the public, and the private sector of all three countries. Traditional coalitions and disciplinary and organizational barriers need to give way to inter-sectoral groups consisting of scientists and political researchers alike, representing the health sector as much as the economic realm, engaging the public as well as private investors. Special emphasis needs to be put on ensuring better flow of information and cooperation among ministries, as well as the fulfillment of the Principle of Public Participation that empowers people to access information, participate in decision-making on environmental matters, and promote environmental justice.[89] In this sense, universities, think tanks, and civil society organizations can play a major role in advancing national plans in relation to climate change through conducting research and providing quantitative and precise data needed for proper actions and decision making. The business community can increase their involvement in national efforts by investing in water and environmental projects if the government creates an enabling environment and incentive for their involvement.

2. Resolving Final Status Natural Water Allocation Issues Between Israel and Palestine

The Palestinian discourse mostly focuses on Israel's control over large parts of the West Bank and its economic restrictions on the Gaza Strip. Palestinian stakeholders express a deep

88 David B. Brooks and Julie Trottier, *A Modern Agreement to Share Water Between Israelis and Palestinians: The FoEME Proposal* (November 2010) 29-30, http://ecopeaceme.org/uploads/12990739030~%5E$%5E~Model_Water_Agreement_Map.pdf.

89 See "Public Participation" United Nations Economic Commission for Europe (UNECE), https://www.unece.org/ro/env/pp/welcome.html. This principle stems from the Aarhus Convention and its Protocol on Pollutant Release and Transfer Registers.

feeling of injustice with respect to their limited ability to access natural resources within the West Bank or due to closure policies for the Gaza Strip. Israel's control over shared natural resources and Areas C of the West Bank constrains Palestine's ability to implement climate change adaptation measures such as the construction of renewable energy, desalination plants, and wastewater treatment facilities. The repercussions of climate change will be most dramatic for Palestine's agricultural sector, which is vital for the country's national security.

Given the technological advances in the manufacture of new water, water issues are no longer a zero-sum game as they were at the time of the signing of the Oslo Accords in 1995. Final status natural water allocation issues are easily resolvable between Israel and Palestine so that climate cooperation can advance based on greater political certainty for the water sector for Palestine.[90]

3. Creating a Roadmap for a Regional, Integrated Plan for Climate Change

After recognizing climate change as a national security issue, the next step should be to expand the discourse on the national implications of climate change onto the regional level. Even though a comprehensive peace deal between Israel and Palestine remains elusive at this point, the past years have shown that an incremental approach can bring about significant (and necessary) changes to the humanitarian and environmental situation of the region. The next step for Jordan, Palestine, and Israel is to devise a roadmap for creating a regional, integrated plan to combat the impact of climate change on the region. To do so, the three countries first have to establish a channel of communication to discuss individual and shared interests, assets, and needs. For this purpose, existing bodies, such as the UNFCCC's workshop facilitative sharing of views (FsV) could serve as a guiding framework.[91] The workshop creates an open exchange platform that can be used for countries to discuss questions, concerns, and ideas pertaining to climate change mitigation and adaptation.

Such a platform for communication could also be used to renegotiate cooperative agreements over shared water resources to incorporate the effects of climate change. When assessing the viability of regional projects, the costs and benefits should be weighed against unilateral solutions. The current water agreements between Israel and Jordan and Israel and Palestine lack the necessary flexibility to account for climate-related impacts such as consecutive years of drought. It should also be evaluated whether the regulations on water distribution should include provisions to accommodate demographic developments such as population growth or refugee movements.

In light of the stark influx of refugees over the past years, the latter is a particularly pressing issue for Jordan. While past governmental projections have failed to count for emergencies

90 Oded Eran, Gidon Bromberg, and Giulia Giordano, *Israel Water Diplomacy and National Security Concerns* (Policy Paper, January 2018), http://ecopeaceme.org/wp-content/uploads/2018/01/Water_Diplomacy.pdf.

91 See UNFCCC, "The Facilitative Sharing of Views under the ICA Process," https://unfccc.int/process/transparency-and-reporting/reporting-and-review-under-the-convention/biennial-update-reportsand-international-consultation-and-analysis/facilitative-sharing-of-views.

including the frequent influx of refugees, future plans better take the scenario of more refugees as a given considering that Jordan exists in a very unstable region. Regional agreements should be revised especially with Syria in relation to the Yarmouk River and with Israel in relation to the Jordan River after hosting hundreds of thousands of Syrian refugees. Israel, too, identified the risk of massive population displacement as a critical threat in the future. Representatives from Israel expressed concern over the likelihood of more frequent and extreme droughts, which are creating climate (specifically water) refugees. They went on to emphasize that Israel has the technology and know-how to ensure its own climate security, but that it needs to safeguard the stability across the region in order to protect itself from climate refugees.

A concerted, regional approach to climate action could, thus, be an important step to build trust and confidence among regional stakeholders. To start off, water and energy present themselves as the lowest hanging fruits. All three countries have a vested interest and a need to expand and secure their water supply. Given the technological advances in the manufacture of new water, water issues are no longer a zero-sum game. At the same time, new forms of energy production, for example through the use of large-scale solar energy fields, can lead the way towards secure, sustainable, and cost-effective energy supply.

Jordan, Israel, and Palestine should engage in a strategic discussion on the Water Energy Nexus proposal of EcoPeace and the Konrad Adenauer Foundation.

4. Upgrade Water Infrastructure and Reassess Tariff System

A major barrier to augmenting water supply in Jordan and Palestine is the tremendous loss of water and revenue due to damaged water infrastructure (physical and water administration loss) and inefficient service provision. Despite high network coverage, service delivery in the West Bank is often poor with intermittent supply, high levels of physical losses and other non-revenue water, and large variations in per capita supply between communities. Damages to the water infrastructure as well as water illegal connection, meter manipulation or illegal syphoning have caused water and revenue losses of around 40 percent (in some places more than 50 percent).[92]

Similarly, Jordan's estimated losses amount to more than half of the water supplied per person each day.[93] The result is not only an immense loss of revenue needed to improve and expand services, but also a decline in available water for Jordan and Palestine's population and industry at a time when the gap between water demand and water supply becomes ever starker. While the acquisition of additional water is undoubtedly a necessary step, the

92 The World Bank, *Toward Water Security for Palestinians: West Bank and Gaza Water Supply, Sanitation, and Hygiene Poverty Diagnostic* (World Bank Group, 2018) 12.

93 Jordanian Ministry of Water & Irrigation, National Water Strategy 2016-2025, (2016), 15, http://www.mwi.gov.jo/sites/en-us/Hot%20Issues/Strategic%20Documents%20of%20%20The%20Water%20Sector/National%20Water%20Strategy(%202016-2025)-25.2.2016.pdf.

first task should be to work in the margins of what is unilaterally implementable and sure to increase water supply without having to invest in the development of new water sources.

To offset lower levels of ground and surface water induced by climate-related changes, both countries have initiated comprehensive reforms towards upgrading their water network systems and service provision. Jordan and Palestine have started to make fundamental revisions to their water and wastewater tariffs to promote smart water use, incentivize wastewater treatment, and narrow the gap between expenditures and revenues in the water and wastewater sector, however, the implementation of these reforms has advanced only slowly. In its latest report *Toward Water Security for Palestinians* (2018), the World Bank criticizes the low level of accountability between the Palestinian Water Authority and service providers, as well as the present lack of sanctions for inefficient service providers with high levels of water loss. Improving cost recovery will be critical for advancing Jordan and Palestine's desalination and water treatment plans in order to cover future operation costs, making the sectors financially sustainable, and lessen dependence on international donor support. Therefore, it is critical for Jordan and Palestine's water security that these reforms will be pursued and implemented in a timely manner.

5. Recommendations to the International Community

One part of the conversation around climate change mitigation and adaptation in the Middle East focuses on financial and technological assistance from the international community. Jordan and Palestine both set climate mitigation and adaptation measures that are contingent on international support. Their viewpoint is congruent with many voices of the global discourse on climate finance. While both industrial and developing countries are now engaging in strategies for climate change mitigation and adaptation, the moral obligation to finance these measures is believed to lie with richer countries, given their seized contribution to climate change over the past centuries.

As this analysis has shown, however, international financial assistance to climate action is not only enabling progress on the mitigation and adaptation level, but further corresponds to the international community's strategic interest to safeguard the balance and stability in the Middle East. Globally the Middle East region is recognized as of important strategic interest and that climate change poses a direct threat to the region's stability. Opportunities to engage with the international community will come through development assistance, private sector investment, and through the exchange of know-how and resource strategies. International support is particularly high for initiatives that center around water and energy and that incorporate a peace dividend by strengthening regional relations. As such, projects such as the Water Energy Nexus would speak directly to the interests of the international community and private sector investors.

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