Climate Centre

Country-level | Climate fact sheet

Israel and the Occupied Territories (ILOT)

1. Country overview

The state of Israel and the occupied Palestinian Territories, also collectively known as ILOT (Israel and Occupied Territories), are located on the south-west tip of the Asia continent, in the eastern Mediterranean basin. The occupied Palestinian Territory (oPT) consists of Gaza and the West Bank, including East Jerusalem. With Lebanon and Syria to the north, Jordan to the east and Egypt to the south, the ILOT region is one of the most populous regions in the Middle East.

Figure 1: Map of Israel. Source: Michelbotman

Figure 2: Map of the governates of the Palestinian Territories. Source: Fanack.

Israel occupies the majority of this region with approximately 20,800 square kilometres (km^2) and has quite a diverse topography. Approximately 45 per cent of Israel is arid, while the rest of the country consists of plains and valleys (25 per cent), mountain ranges (16 per cent), the Jordan Rift Valley (9 per cent) and the coastal strip (5 per cent) (United Nations Framework Convention on Climate Change (UNFCCC) 2018). The West Bank occupies approximately 5,800 km^2 and is home to approximately 2.9 million people. The Gaza Strip is a narrow coastal strip of land along the Mediterranean Sea with a total area of 365 km^2.

Figure 3: Israel's ND-GAIN Ranking (ND-GAIN 2021).

The ILOT region is truly a confluence of new and old cultures, with cities being founded as far back as 3,000 years ago, while some states that formed just in the last century. It is the birthplace of three religions: Judaism, Islam and Christianity.

Israel ranks 29 out of 181 countries in the Notre Dame Global Adaptation Initiative (ND-GAIN) index. The ND-GAIN index summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. This ranking indicates that Israel has low vulnerability levels, and high levels of readiness to adapt to climate change (ND-GAIN n.d.). It is important to note, however, that the West Bank and Gaza are not incorporated in this ranking and there is not

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a separate ranking available for oPT. Due to a variety of heightened vulnerabilities as a result of Humanitarian Complex Emergencies, the ranking for Occupied Palestinian Territories (oPT) would likely be much lower (Hawajri 2016).

1.1 Climate

The ILOT region is in a "transition zone between the hot and arid southern part of West Asia and the relatively cooler and wetter northern Mediterranean region" (World Bank n.d.). However, the climate is predominantly Mediterranean, with long, hot, dry summers and short, cool, rainy winters, modified locally by altitude and latitude. Israel has a Mediterranean climate to the north, an arid climate to the south and a narrow, semi-arid strip in between (World Bank n.d.). January is the coldest month, with temperatures from 5–10°C, and August is the hottest month at 18–38°C. About 70 per cent of the average rainfall in the country falls in November–March, while the months of June–August are often rainless. Rainfall is unevenly distributed, decreasing sharply as one moves southwards. In the extreme south, rainfall averages less than 100 millimetres (mm) annually; in the north, average annual rainfall is more than 1100 mm (Food and Agriculture Organization of the United Nations (FAO) 2008a).

The occupied Palestinian Territory has five major climatic zones: Jordan Rift Valley (where soil salinization is the biggest challenge); Eastern Slopes Region (in between the sea and desert); Central Highlands (400–1000 metres (m) above sea level); Semi-Coastal Region; and the Coastal Plain of Gaza (FAO 2008b). The West Bank is relatively arid, with about 50 per cent of the land receiving rainfall less than 500mm/year, with a hyper-arid area with rainfall less than 100mm/year. The northern part of the West Bank receives the most rainfall, approximately 700mm/year; whereas the southern end receives only 80–100mm/year (United Nations Development Programme (UNDP) 2010). The Gaza strip has a predominantly flat coastal terrain and receives between 200–400mm/year of rainfall (UNDP 2010).

1.2 Climate change

Historical Climate	Projected climate
Temperature	
The mean annual temperatures recorded in Israel have increased steadily since the 1990s, although currently levels are slightly lower than in the 1950s and 1960s due to relatively high temperatures in those decades (UNFCCC 2018). Mean temperature in the oPT increased by 1°C during the 19th century; there is medium confidence that the rate of increase was highest in the final 20 years of the century (Tipomann & Baroni 2017). The number of warm days and nights in the oPT has increased since 1950 (Tippmann & Baroni 2017).	For the southern and eastern Mediterranean, warming over the 21st century will be larger than global annual mean warming at 2.2–5.1°C, according to a realistic emissions scenario (Scenario A1B) (IPCC 2014). A general increase in seasonal mean temperature in Israel is projected throughout the country, with peaks of around 2.5°C, especially in winter and autumn 2041–2070 under the Representative Concentration Pathway (RCP) 4.5 scenario. (Hochman *et al.* 2018). In a medium range scenario, annual mean temperature in the oPT will increase by around 1°C by 2025, by about 2°C by 2055, and by approximately 3°C by 2090 (Tippmann & Baroni 2017; UNFCCC 2016b)

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Precipitation

Annual average precipitation over ILOT shows a slight decline in rainfall amounts (International Research Institute for Climate and Society (IRI) n.d.).

Ten centimetres (cm) of sea level rise has been observed in the Mediterranean Sea over the past two decades (Israel Ministry of Environmental Protection (IMEP) 2014a).

Annual average precipitation is likely to decline in the eastern Mediterranean by 20 per cent by 2050 – with an increased risk of summer drought (IPCC 2014).

Under a mid-range scenario, annual rainfall in the oPT decreases by around 10 per cent by 2025, by about 15 per cent by 2055, and by approximately 20 per cent by 2090 (Tippmann & Baroni 2017; UNFCCC 2016a).

Seasonal rainfall is projected to decrease up to 40% in the north and central regions, while southern arid regions may see equally large increases in winter and spring (Hochman *et al.* 2018). Extreme rainfall events are projected to increase especially in the south (Hochman *et al.* 2018).

Globally, sea levels are projected to rise by an additional 20–30cm by 2050 and by somewhere in the range of 50–200cm by 2100, depending on levels of emissions, with at least one study projecting levels rising as high as 280cm (Kulp *et al.* 2019).

1.3 Climate variability

The increasing trend of temperature and sea level rise has been connected to a rise in flooding along the coastal plains and an increase in saltwater intrusion to the coastal aquifer (Vengosh and Rosenthal 1994). Additionally, Israel and the Gaza Strip have experienced an increase in wave storms, with wave heights exceeding 5m during extreme storms (Kit and Kroszynski 2014).

There have been several specific extreme weather events in ILOT over the past few years (UNFCCC 2018). A winter storm named Alexa in 2013 was the worst storm to hit the region in 60 years, with significant precipitation in the form of both rain and snow. Only three months later, in March 2014, there was an unprecedented low volume of rainfall and rainy days. In August 2015, a heat wave struck the Middle East, causing extremely high temperatures in ILOT, reaching up to 49°C in the Jordan Rift Valley (UNFCCC 2018).

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2.Humanitarian sectors and climate change

2.1 Water and habitat

It is expected that future climate change impacts, such as increased temperature and decreased precipitation will have an adverse effect in ILOT (Ministry of Environmental Protection (MOEP) 2020). The region is already facing significant stress on water resources, and climate change impacts will likely worsen the existing situation and may lead to competition and tension with neighbouring countries sharing transboundary river basins, such as along the Jordan and Yarmouk Rivers (Teotónio *et al.* 2020).There is also no resolution on natural water allocations between Israel and the oPT; which, if agreed, may ease cooperation and management in the water sector (The Applied Research Institute – Jerusalem (ARIJ) 2012).

Due to rising temperatures, the frequency and severity of urban heatwaves in the region will worsen, resulting in increased water demand (Linares *et al.* 2020). On the other hand, the Sea of Galilee (or Lake Tiberias, Kinneret or Kinnereth) is a critical water source for ILOT (MFA n.d.). It is also essential for fishing, tourism and other recreational activities, directly contributing to Israel's economy. However, it is observed that the water level of the lake is dropping dramatically. A study has shown that temperature, precipitation and other hydrological data supports the position that climate change's adverse impacts, such as rising temperature and reduction in average precipitation, is driving this contraction. If adequate measures are not taken, future climate change risks will lower the water level further (Tal 2019). Furthermore, Gaza and the West Bank have no surface water and rely solely on groundwater aquifers. However, "it is estimated that 95 per cent of Gaza's aquifer is not safe for drinking without desalinization treatment" (Ministry of Foreign Affairs (MFA) 2018). The Sea of Galilee (or Lake Tiberias, Kinneret or Kinnereth), along with other wetlands in the region, are one of the prime sources for recharging aquifers (MFA 2018). Therefore, a continued reduction in the water level of the lake may pose a water security threat in Gaza and the West Bank for drinking water and agricultural activities (World Bank Group 2018).

Moreover, there is clear evidence that reduced precipitation and increased temperature are enhancing the desiccation and mortality of shrubs and trees. The projected climate change impacts will likely lead to further desiccation of woody plants, especially the Mediterranean Oak. Consequently, it will not only exacerbate extreme heatwave impacts in cities but will also alter the migration of birds, causing changes in species distribution and, eventually, impacting inland biodiversity (Sternberg *et al.* 2015).

Research indicates that, in 2017, there was an 80 per cent extension of agricultural drought in the Middle East region. Furthermore, in 2009, the hydrological drought extent reached 50 per cent in the region, which is likely to impose a threat to food security across the entire Middle East, including ILOT (Hameed *et al.* 2020). In addition, the stress on water resources will have a direct impact on energy generation, as hydropower is a significant source of power generation in the Mediterranean region. Thus, it is expected to have adverse effects on the region's economy too (Teotónio *et al.* 2020).

Sea level rise drives seawater intrusion and deteriorating groundwater quality in ILOT, especially in the coastal aquifer (Melloul and Collin 2009). The sea-level rise is likely to be causing wave overtopping, which affects marine structures and coastal infrastructure (Zviely *et al.* 2015). In Israel, "sea-level rise on inland infrastructure is expected to result in loss of habitat area and earnings that are estimated at the level of 47 million US dollars and 95.5 million US dollars per year, for a sea-level rise of 0.5m and 1m respectively" (Zviely *et al.* 2015). Furthermore, flooding along the coastal plains will worsen the food security and health impacts in the region (FAO 2011).

2.2 Economic security

The technology, agriculture and service sectors are some of the significant contributors to Israel's economy (Central Intelligence Agency (CIA) n.d.). Climate change impacts – such as rising temperature, decreased precipitation and changes in rainfall patterns – are likely to pose an adverse effect on the industrial productivity of Israel as water stress intensifies (Teotónio *et al.* 2020). The insurance business is one of the most vulnerable to climate change impacts in Israel (UNFCCC 2010).

In oPT, the agriculture sector generates 11.5 per cent of total employment in the country (Tippmann & Baroni 2017), particularly for women, and is an important contributor to GDP (MFA 2018), however this has declined since the 1970's. According to a report by the United Nations Conference on Trade and Development (UNCTAD) on its assistance to the Palestinian people, "in 2018 and early 2019, the Palestinian economy stagnated, per capita income further fell by 1.7 per cent, unemployment increased, poverty deepened, and the environmental toll of occupation rose in the occupied Palestinian territory" (UNCTAD 2019).

In Israel, 1.1% of the labour force is employed in the agricultural sector, contributing 2.4% to the country's GDP (CIA n.d.). The agriculture sector is highly vulnerable to climate change in Israel because of its proximity to the aridity line and scarcity of agricultural land. Therefore, the importance of the farming sector in Israel has decreased considerably (USDA 2011). Due to the greater reliance on rainfed agriculture in the West Bank, depleting amounts of water available to Palestinians overall, and the dire water situation in Gaza, Palestinians are much more vulnerable to climate change (Feitelson *et al.* 2012).

Both the extent and frequency of drought is likely to rise in the future in the region. Consequently, drought events will negatively impact crop yield (Hameed *et al.* 2020). Decreased precipitation will likely lead to irrigation practice in agricultural activities; however, since there is already a lack of water for irrigation, rainfed crop production will be significantly affected. As a result, Israel will need to rely on higher levels of imported vegetable products, which will likely impact the economy indirectly (Zelingher *et al.* 2019). Rising temperatures will also worsen the production on some agricultural farms that are sensitive to heat, such as chicken farms, although it should be noted that Israel has been coping with the constraints of the natural environment for agriculture and livestock with artificial practices. Nonetheless, it is expected the demands for heating and cooling will increase (USDA 2011). Rising temperatures and shorter winters are also likely to generate more pests and pathogens, which will increase crop diseases and, as a result, reduce agricultural productivity (Ben-Gurion University of the Negev 2000).

Furthermore, climate change impacts in the region will result in less vegetation in pasture lands, increased animal disease, and scarcity of drinking water for animals, which will affect the livestock in the area (Hameed *et al.* 2020). The expected decrease in water availability will result

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in substantial economic damage to agriculture with the 50 percent reduction in freshwater, considered as a realistic scenario leading to a loss of approximately 100 million US dollars a year and thousands of jobs (USDA 2011).

Climate change impacts will also pose acute stress on the biodiversity of the region. The rising water temperature will affect freshwater and marine eco-systems, which will lead to a decline in fishing. As a result, livelihoods and food security will be impacted (Sternberg *et al.* 2015). Frequent drought events will lead to loss of agricultural land and desertification, especially in the occupied territories region (UNFCCC 2010). Moreover, forest fires in the region cause severe economic and environmental damage, and more dry days are likely to exacerbate the risks of forest fire in the future (Turco *et al.* 2017). Nonetheless, Mediterranean and desert climates are characterized by high genetic diversity, and these areas are expected to be of major importance in maintaining biodiversity under climate change (IMEP 2014a).

2.3 Health

Climate change poses a risk to health, both directly and indirectly. Some of the direct health effects of climate change in the Mediterranean region (including ILOT) are heat stress due to extreme heatwaves and drought as well as an increase in vector-borne diseases. The indirect health risks due to climate change are caused by the adverse impact on water availability, food provision and quality, air pollution, and other stressors (Linares *et al.* 2020).

Extreme heat can increase morbidity and mortality of the most vulnerable such as older people, especially those above 65 years of age; people with pre-existing health conditions, such as heart disease, respiratory illness and diabetes; young children; and people who are homeless or have inadequate housing (IFRC *et al.* 2019). Although more cardiovascular disease has been observed during the summer months in Israel, there is no evidence to substantiate the argument that it is because of increasing temperatures or extreme heatwaves in the region. However, extreme heatwave-related morbidity and mortality will likely be intensified in the region due to climate change (Green *et al.* 2013). Urban heat islands (UHI) are one of the greatest threats due to climate change since ILOT is a highly urbanized– e.g., 92.6 per cent of the total population lives in urban areas as of 2020 in Israel (Linares *et al.* 2020). Furthermore, Israel is at risk of higher mortality due to prolonged heatwaves based on the experience of Europe in 2003 (Green *et al.* 2013). However, it should be noted that Israel's existing infrastructure for dealing with high heat is more advanced that Europe's.

The warmer days in the region will lead to a higher exposure to vector-borne diseases, especially dengue and West Nile virus (Linares *et al.* 2020). The shifts and changing intensity of seasons and different human and animal migration combined may cause a change in the geographical distribution of diseases and their seasonal patterns (UNDP 2010). Furthermore, the indirect health effects arising from food insecurity, air pollution, conflicts and migration are rising significantly in ILOT and climate change impacts will exacerbate the present situation (Green *et al.* 2013).

Both Israel and the oPT are vulnerable to adverse health impacts of climate change. In Israel over 20 per cent of the population is older than 55 years old, a group that is most susceptible to direct as well as indirect health risks caused by climate chanhe (Linares *et al.* 2020). Health impacts are likely to be disproportionately high in oPT due to the added strain on the existing fragile healthcare system (Keelan 2016).

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2.4 Protection

Climate change risks pose a significant threat to ILOT's current and future development. The area has both bio-physical and socioeconomic vulnerabilities, and limited capacity to respond to the climate crisis. According to IMEP, flooding will pose additional stress to approximately 2.5 million people residing in coastal districts (such as Haifa and Tel Aviv) and 2.8 million people living along the riverside (IMEP 2014a). Moreover, rising temperatures and increased frequency and intensity of heatwaves will lead to more forest fire incidences in the region (IMEP 2014a).

Along with the climate crisis, the ILOT region faces disproportionate geographic risks. According to UNDP, the Israeli occupation "fosters a wide range of maladaptive policies and practices (e.g. subsidized water-intensive livestock farming by Jewish settlers and the destruction of Palestinian/ Arab olive groves) that frustrate the development of Palestinian resilience to climate hazards. In both the West Bank and especially the Gaza Strip, the enforced coping strategies of Palestinians as a result of access and movement restrictions are incompatible with the effective delivery of human development goals" (UNDP 2010 p.68).

In addition, around the world, people in detention frequently have heightened vulnerability to natural disasters due to: spatial marginalization resulting from prison locations on hazard-prone land and/or isolation from emergency evacuation services; limited to no connections to social networks, which are crucial aspects to hazard resilience; and political marginalization, including lack of policies and services to prevent disaster impacts on imprisoned populations (Gaillard & Navizet 2012). These vulnerabilities, coupled with more frequent and intense disasters due to climate change, may leave prison populations in especially precarious positions to hazards such as extreme heat and floods.

2.5 Policy

The Israeli Climate Change Information Center (ICCIC), part of the IMEP, has compiled and is managing over thirty strategies for coping with the effects of climate change (IMEP 2014b). Israel signed and ratified the Paris Agreement in 2016 (UNFCCC n.d.) and submitted its first Nationally Determined Contribution (NDC) in 2015. This submission outlines its climate change mitigation and adaptation commitments to the UNFCCC. In terms of mitigation, Israel commits to a 2030 target to reduce per capita greenhouse gas emissions by 26 per cent compared to a 2005 baseline. This will include efficiency investments in energy, transportation, industrial processes, agriculture and waste (UNFCCC 2015a). Israel's adaptation commitments in this document are sparse but include a commitment to develop a National Adaptation Plan and to leverage the Israeli Climate Change Information Center, a consortium of academic partners, to assess adaptation needs and provide recommendations (UNFCCC 2015a). In 2018, the IMEP launched a national programme for adapting to climate change, which has five priorities (IMEP 2018):

1. Reducing human and property damage, and building economic resilience
2. Increasing the resilience of the natural systems
3. Building and updating the scientific knowledge base for decision-making
4. Education, awareness-raising, and accessibility of information
5. Israel's integration into the global effort, in accordance with its commitments, and the promotion of regional and international cooperation

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Palestine[1] signed and ratified the Paris Agreement in 2016 (UNFCCC n.d.). It submitted its NDC in 2015, which commits to a 12.8 per cent emissions reduction by 2040, against business-as-usual projection. It also submitted a more ambitious but conditional emissions reduction target of 24.4 per cent against business-as-usual. The condition for this more ambitious scenario is independence (UNFCCC 2015b). It's pathways to emissions reduction include afforestation projects, greening initiatives, and the introduction of solar energy. Additional pathways, conditional on international support, include 20–33 per cent energy generation from photovoltaics; municipal waste incineration instead of coal; and various transportation upgrades.

The NDC also outlines adaptation priorities including agriculture and food security improvements, coastal management issues, health considerations, urban development, and various water resource management priorities. Agriculture priorities include irrigation schemes, improved land-use planning, improved livestock production, food price stabilization and cultivation of olives, grapes and vegetables. Water priorities include rehabilitating water sources, improving system efficiency, a renegotiated water agreement, improved stormwater management, and a desalination plant. Coastal adaptation priorities include reclamation projects, fishery improvements, and construction to prevent erosion (UNFCCC 2015b). Palestine has also developed a National Adaptation Plan which further details adaptation priorities (UNFCCC 2016a).

Despite the plans, integrated climate change considerations have received low priority in the national security agendas of ILOT (The Association of Environmental Justice in Israel (AEJI) 2017). However, it is recommended for climate change considerations to be included in the national security agenda of both Israel and Palestine (EcoPeace Middle East 2019). This entails conducting joint assessments, analysis and development of strategies to respond to the national security threats of climate change.

1 Note: The NDC was submitted by the 'State of Palestine', therefore, the language in this section has been adjusted accordingly.

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