

Towards the development of agricultural insurance in Palestine in considering the challenges of water and land

Hacia el desarrollo del seguro agrícola en Palestina teniendo en cuenta los retos del agua y la tierra

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ABSTRACT

The study aimed to analyze the reality of agricultural insurance in Palestine in light of the challenges of water and land. In addition, referring to the technological applications that are used in agricultural insurance. Which contribute to the development of that sector. And used the historical approach based on two important axes: 1 - agricultural lands in the West Bank and Gaza Strip under the practices of the Israeli occupation, 2 - the Palestinian water sector under the Israeli occupation. The study concluded that agricultural insurance in Palestine is in the preliminary stage, due to the inability of insurance companies to bear the losses resulting from the risks of occupation practices, such as the occupation practices in destroying agricultural lands with several unrealistic justifications, as well as controlling and plundering Palestinian water resources.

KEYWORDS: Insurance, Agricultural, Water, Palestine.

RESUMEN

El estudio tiene como objetivo analizar la realidad del seguro agrícola en Palestina bajo el prisma de la lucha por el agua y la tierra, y las aplicaciones tecnológicas utilizadas en este sector, y utilizó el enfoque histórico basado en dos ejes importantes: 1 - Las tierras agrícolas en Cisjordania y la Franja de Gaza bajo las prácticas de la ocupación israelí, 2 - el sector del agua palestino bajo la ocupación israelí. Señaló que el seguro agrícola en Palestina se encuentra en la etapa preliminar, debido a la incapacidad de las compañías de seguros para asumir las pérdidas derivadas de los riesgos de las prácticas de ocupación, por ejemplo, las prácticas de ocupación en la destrucción de tierras agrícolas con varias justificaciones poco realistas, así como el control y saqueo de los recursos hídricos palestinos.

PALABRAS CLAVE: Seguros, Agricultura, Agua, Palestina.

Vers le développement de l'assurance agricole en Palestine en tenant compte des défis de l'eau et de la terre

RÉSUMÉ

L'étude visait à analyser la réalité de l'assurance agricole en Palestine sous le prisme de la lutte pour l'eau et la terre et les applications technologiques utilisées dans ce secteur, et a utilisé l'approche historique basée sur deux axes importants : 1 - les terres agricoles en Cisjordanie et dans la bande de Gaza sous les pratiques de l'occupation israélienne, 2 - le secteur de l'eau palestinien sous l'occupation israélienne. A conclu l'étude il a souligné que l'assurance agricole en Palestine est au stade préliminaire, en raison de l'incapacité des compagnies d'assurance à supporter les pertes résultant des risques des pratiques d'occupation, telles que les pratiques d'occupation en détruisant les terres agricoles avec plusieurs justifications irréalistes, ainsi qu'encontrôlant et en pillant les ressources en eau palestiniennes.

MOTS-CLÉ: Assurance, Agricole, Eau, Palestine.

Para o desenvolvimento do seguro agrícola na Palestina, tendo em conta os desafios da água e da terra

RESUMO

O estudo teve como objetivo analisar a realidade do seguro agrícola na Palestina à luz dos desafios da água e da terra. Além disso, referindo-se aos aplicativos tecnológicos usados no seguro agrícola. Que contribuem para o desenvolvimento desse setor. E utilizou a abordagem histórica com base em dois eixos importantes: 1 - terras agrícolas na Cisjordânia

e na Faixa de Gaza sob as práticas da ocupação israelense, 2 - o setor hídrico palestino sob a ocupação israelense. O estudo concluiu que o seguro agrícola na Palestina está em estágio preliminar, devido à incapacidade das seguradoras de arcar com as perdas resultantes dos riscos das práticas de ocupação, como as práticas de ocupação que destroem terras agrícolas com várias justificativas irrealistas, além de controlar e saquear os recursos hídricos palestinos.

PALAVRAS-CHAVE: Seguro, Agrícola, Água, Palestina.

Verso lo sviluppo dell'assicurazione agricola in Palestina considerando le sfide dell'acqua e della terra

SOMMARIO

Lo studio si proponeva di analizzare la realtà delle assicurazioni agricole in Palestina alla luce delle sfide legate all'acqua e alla terra. Inoltre, si è fatto riferimento alle applicazioni tecnologiche utilizzate nell'assicurazione agricola. Che contribuiscono allo sviluppo del settore. E ha utilizzato un approccio storico basato su due importanti assi: 1 - i terreni agricoli in Cisgiordania e nella Striscia di Gaza sotto le pratiche dell'occupazione israeliana, 2 - il settore idrico palestinese sotto l'occupazione israeliana. Lo studio ha concluso che l'assicurazione agricola in Palestina è in fase preliminare, a causa dell'incapacità delle compagnie assicuratrici di sostenere le perdite derivanti dai rischi delle pratiche di occupazione, come le pratiche dell'occupazione di distruggere i terreni agricoli con diverse giustificazioni irrealistiche, nonché di controllare e saccheggiare le risorse idriche palestinesi.

PAROLE CHIAVE: Assicurazioni, Agricoltura, Acqua, Palestina.

Introduction

Palestine is located in southwest Asia on the eastern shore of the Mediterranean Sea. It is border on the east by the Jordan River and the Dead Sea, on the west by the Mediterranean Sea, on the north by Syria and Lebanon, and on the south by Sinai and the Gulf of Aqaba. Palestine has arid climate and very limited water resources. The average annual precipitation in the West Bank is about 450 mm and 400 mm in Gaza. The population prospects of Palestine have increased demand on already low water reserves. In addition to climatic factors, Palestine faces an additional burden of political and economic challenges resulting from the Israeli occupation, which has negatively affected access to and management of water resources¹.

Water quality and quantity issues in Palestine have received the attention of local and international non-profit organizations, academic institutions and international development agencies such as the United Nations and the World Health Organization. These entities contributed significant resources to research and raise awareness about water conditions in Palestine. In its 2009 report, the Israeli human rights organization B'Tselem indicated that the Israeli occupation army destroyed water tanks and other infrastructure in various areas of the West Bank.

Accordingly, the reality of the Palestinian agricultural sector is not much different from the water sector due to the vital role of water in the agricultural sector; in addition to that it faces drought or frost, which are above the will and ability of the Palestinian farmer. All these risks facing the Palestinian agricultural sector necessitate the need to establish agricultural insurance that contributes to mitigating or avoiding the effects of these risks². In this research, we will focus on agricultural insurance in Palestine and discuss the details of the water and agricultural sector in Palestine.

Brief of the economy of Palestine

We cannot explain the behavior of the Palestinian economy and its indicators without mentioning the political situation and the historical events that the Palestinian people have endured. The Palestinian economic

system was fragile and weak due to the consequences of the 1967 war. Low rates of prosperity, low gross domestic product, low family income, low per capita income, high unemployment rates and frequent widening of poverty characterized it. All of them have posed serious challenges to economic development. In 1994, the Paris Economic Protocol concluded between the Palestinian side and the Israeli occupation, with the important goal of "laying the foundation for strengthening the economic base of the Palestinian side and exercising its right to make economic decisions in accordance with its development plan and priorities." The protocol also aims to establish a "sound economic basis" for relations between the two views that the economic field represents "the cornerstone of their mutual relations."

Supporters of the agreement believe that to increase the freedom of the Palestinian market from some of the restrictions of the Israeli occupation. For example, it allowed Palestine to import petroleum products from countries other than Israel, and the Palestinian Authority was granted 75% of tax revenues, as well as exempting from paying any customs or taxes on the aid it receives from the supporting countries in order to develop non-commercial humanitarian projects. On the other hand, opponents of the Paris Protocol believe that Israel's policies have intensified and it has not implemented what was agreed upon. Evidence for this is that the closure policy increased in the mid-1990s and imposed obstacles in front of Palestinian workers, which reduced their contribution to the Palestinian GDP, in addition to the systematic policies in destroying the various sectors of the Palestinian economy³.

In 2007, the gross domestic product reached \$5,505.8 million in 2007, which represents growth of 0.6% compared to 2006, which amounted to \$4,910.1 million in 2007. While in 2008 a period of relative calm, private savings increased as foreign aid increased and consumption stabilized. However, the period of conflict years (2003-2005 and post-2008 and beyond), private savings declined. The positive side was the continued flow of foreign aid⁴.

The period from 2009 to 2013 was marked by economic stability and prosperity, which the peak being reached in 2011 when the gross domestic product grew by 12.4%. This was largely due to the high growth rate in the Gaza Strip, which reached more than 17%, compared to 5.2% in the West Bank. The main contributing

¹ World Health Organization, 2015.

² Barghouthi, 2009.

³ Raghad Azzam Injass, 2017.

⁴ <https://english.wafa.ps>.

factors was the increase in international aid and grants for the construction sector in the Gaza Strip, which contributed to the GDP by 29.9%, while the services sector contributed by 30%. The labor force participation rate increased, rising from 41.1% in 2010 to 43.0% in 2011, with the number of workers in the Palestinian Territory reaching 837,000 workers in 2011, up from 744,000 in 2010.

However, the Palestinian political situation continued to affect economic growth until 2019, when the GDP growth rate in Palestine reached 0.9%, down from 1.2% in 2018⁵. In 2020, the unemployment rate in Palestine increased to 27.2%, with the Gaza Strip having a rate of 46.6% and the West Bank 8.16%. Although the unemployment rate decreased slightly from 2019 to 2020, it remained a significant challenge for the Palestinian economy⁶.

Insurance sector in Palestine

The insurance sector is widely recognized as one of the most important contributors to a country's economy, as it provides a safety net for the society's human and material resources. Additionally, the insurance industry fuels economic development by channeling financial investments into societies.

According to reports by the Swiss Sigma Corporation, the insurance sector's activity has grown much faster in developing countries than in developed countries, with significant increases in demand for life insurance and commercial activities that contribute a large percentage to the Gross Domestic Product (GDP) of these countries. The Sigma Foundation's statistics confirm that 96% of the global insurance sector is concentrated in developed countries, primarily due to the large-scale projects and the culture of insurance prevalent in these countries, particularly in the area of life insurance. In contrast, the Middle East region accounted for less than 1% of global insurance premiums in 2015.

Since the Palestinian economy is currently under occupation, it is impossible to discuss it without examining the political events that have affected it. As the insurance sector is a component of the Palestinian economy, we will provide an overview of its historical developments in two phases: before and after the establishment of the Palestinian Authority in 1994.

⁵ Palestinian Economic Performance, 2014, 2017, 2019.

⁶ United Nations Conference on Trade and Development (UNCTD), 2017.

The insurance sector before the establishment of the Palestinian Authority in 1994

Insurance activities in Palestine were limited before 1994, making the Palestinian insurance sector a relatively new addition compared to other sectors. During this time, insurance was offered in the West Bank through branches of Jordanian and foreign insurance companies and agents. In the Gaza Strip, branches of Egyptian insurance companies provided insurance. Following the Israeli occupation of 1967, the market remained small until 1975, with insurance companies serving as branches of Israeli companies or agencies of foreign companies.

In 1975, the Arabia Insurance Company was established with a capital of \$1 million. However, it faced competition from Israeli insurance companies and some foreign insurance company agencies, and this continued until the outbreak of the first intifada in 1987. The intifada forced Israeli insurance companies to withdraw from the market, leaving the Arab Insurance Company as the sole provider. This monopoly ended in 1993 with the establishment of two new insurance companies: Al-Mashreq Insurance Company (MIC) and National Insurance Company (NIC).

The insurance sector after the establishment of the Palestinian Authority in 1994

In 1993, the Palestinian National Authority began regulating the insurance industry and expanded its scope of responsibility to include the sector in 1994. In accordance with the Powers Transfer Agreement, the Authority became the legally authorized and supervisory body for insurance, including licensing insurers and agents, and supervising their activities. After the Palestinian Authority acquired the insurance sector through the Ministry of Finance, it allowed several Arab and foreign insurance companies to operate in Palestine. The number of registered companies reached nine, as recognized by the Ministry of Finance⁷.

Despite significant development, the insurance sector suffered from the absence of legislation and governmental supervision for a long time, leading to chaos and weak insurance confidence. However, in 2004, the Palestinian Capital Market Authority (PCMA) was

⁷ Palestine Monetary Authority (PMA), 2016.

established as the legal official institution to supervise, regulate, and control the sector. The issuance of Insurance Law No. 20 of 2005 helped reorganize the insurance sector, and the PCMA has since set detailed policies to develop the industry, prepare necessary regulations, and provide a suitable environment for its growth. In coordination with concerned authorities, the PCMA is working continuously to ensure the development and organization of the insurance sector, promote public benefit for the general economic activity in Palestine, and raise insurance awareness among society.

The technological innovation in agricultural insurance

In the 21st century, information technology has become the backbone of every industry, especially service industries around the world. One of the most important service industries is the insurance sector. However, the insurance sector has been slower in adopting digital transformation in its activities compared to other sectors, including adopting customer-centric experience design and integrating its offerings into people's daily lives and the daily operations of institutions. With compressed margins, slowing growth, new competition, the impact of the COVID-19 pandemic, and the erosion of traditional manufacturing forces, change is becoming imperative for computerizing the insurance sector⁸.

Advances in science and technology have been beneficial to agriculture, making it more profitable while ensuring sustainability. Technology has also eased the burden on farmers by allowing complex mechanisms to perform most of the functions that would normally be done manually. This means that technology has created better ways to manage soil, water, nutrients, and pesticides while increasing food production and not compromising the environment and human safety⁹.

Technological applications in agriculture

The Global Positioning System is applicable for mapping and routing tasks, and allows for remote monitoring of farms, gates, livestock, equipment/machinery, automatic filling of feed and water troughs, and more.

⁸ Abizer Rangwala, 2020.

⁹ Fomunyam, Emerging Technologies in Agricultural Engenering, 2019.

Blockchain, the most important feature of blockchain is its ability to maintain consistent visibility and correspondence between users. Blockchain has various applications in cryptocurrencies and is crucial in agricultural production in the supply chain sector. There is a close relationship between agriculture and the food supply chain, as the final products produced in agriculture are used as inputs in the supply chain that reaches consumers. Blockchain technology is used to solve real-world problems in agricultural supply chains by tracking certified organic products from soil to table and by entering more data, such as soil, water and produce analytics.

Robotics, robots are increasingly used for various farm jobs, including milking animals. The European Parliament Research Service predicted in 2016 that around 50% of the European cattle herd can be milked by robots by 2025. Note that these are only theoretical implications and that practical applications of automated systems led to the invention of robots. They are designed to take on autonomous or semi-autonomous intelligent roles and come in different sizes and shapes depending on their intended use. Robots are particularly relevant in agriculture, especially in the field of smart farming, as they can work autonomously when integrated with sensors. They can analyze the situation and make decisions, and data from the sensors can improve their decision-making capabilities. Apart from milking livestock, robots can also help remove manure, clean barns, fence fields, and automate agricultural tasks from plowing to harvesting.

The Internet of Things (IoT) has significantly affected human life and work by connecting objects to the Internet, opening up new horizons for the agricultural sector to adopt this technology. In 2010, there were 12.5 billion networked devices. These devices, many of which are equipped with sensors and automatic activation features, can be easily installed and worn anywhere on the body, including plates and leisure activities. They can transfer large volumes of data to their vendors or third parties for real-time analysis or automatically trigger reactions or services. As a result, traditional business and working models in multiple sectors are already being disrupted. The IoT can also enable proper tracking of agricultural products from the farm to the final consumers.

Artificial Intelligence (AI), synthetic intelligence enables software to exhibit human-like intelligence, including studying, planning, reasoning, trouble-fixing, and decision-making AI is quickly turning into more

and more gifted at appearing duties that have historically been tough for computers to execute, which include spotting photos, figuring out spoken phrase, and using unstructured, or unlabeled, statistics. even as presently similarly along its development cycle than blockchain. AI can be applied in general crop management and its operation is critical in pest management, disease management, agricultural produce monitoring and storage control, soil and irrigation management, weed management, and crop forecasting¹⁰.

Smart farming has emerged as a necessary response to the differences in environmental conditions required for optimal crop cultivation, leading to the adoption of new methods for precision agriculture. While other planting methods exist, they do not fully address the need to account for spatial and temporal variations. Precision agriculture achieves this by utilizing intelligent machines to apply inputs in an efficient manner. As a result, compact, small, and smart machines have been developed to reduce waste, improve environmental compatibility, and enhance food sustainability.

A brief of agricultural in Palestine

In 2021, the total cultivated area in Palestine reached 321,096.1 dunums, with approximately 979,752 dunums (89.4%) located in the West Bank and 569,116 dunums (10.6%) in the Gaza Strip. These figures represent the total agricultural area of Palestine¹¹. The Israeli occupation exerts full control over most of the Palestinian territories, with 62.9% of the West Bank classified as Area C according to the Oslo Accords. Only 18.8% of the West Bank falls under Area B, which is under joint Israeli-Palestinian administrative and security control, while just 18.3% is classified as Area A, the only region under full Palestinian control. As the following map shows (figure 1):

Rain-fed agriculture predominates in Palestine, accounting for approximately 81% of the total area of land used for agriculture, with irrigated areas comprising approximately 19% of agricultural land. The irrigated areas are mainly located in the governorates of the Gaza Strip and the Jordan Valley, as well as in

Figure 1. Map of Palestine according to the Oslo Accords in 1994



Source: United Nations Office for the Coordination of Humanitarian Affairs (OCHA), "The West Bank including East Jerusalem and the Gaza Strip."

¹⁰ Fomunyam, Emerging Technologies in Agricultural Engineering, 2019.

¹¹ Palestinian Central Bureau of Statistics, 2023a.

the semi-coastal regions of the West Bank¹². The Israeli occupation imposes obstacles and restrictions on the movement of goods and people, land confiscation, wall construction, water and resource confiscation, and settler violations. These restrictions have a detrimental impact on agricultural investments and economic activities in Palestine. Palestinians have no control over more than 63% of their land (Area C) and no more than 80% of their water resources in the West Bank. In the Gaza Strip, the Israeli occupation has led to a reduction of agricultural land and contributed to the destruction of large areas of farmland during the last three wars in 2009, 2012, and 2014. This has further weakened the already fragile agricultural infrastructure and caused farmers to suffer for prolonged periods. Additionally, the limited availability of agricultural resources, drinking water, and cultivated areas exacerbates the challenges faced by Palestinians in Gaza. It is important to note that the Gaza Strip is one of the most densely populated areas in the world, with two million people residing in an area of 365 square kilometers¹³.

Regarding the economic aspect of the Palestinian agricultural sector, the value of agricultural production in 2019 at constant prices reached \$1.0915 billion, which represents an increase of \$500 million compared to 2015. The benefit of the agricultural sector in Palestine was \$339.1 million in 2012, accounting for 4.6% of the gross domestic product at that time. However, this contribution decreased to 3.8% in 2014, with the benefit of the agricultural sector amounting to \$286.4 million despite its contribution of 8.2% to the GDP in 2000. In the early 1970s, the value of agricultural imports and exports was equal, ranging between \$20-30 million. However, by 2014, annual agricultural imports had significantly exceeded exports, with total agricultural imports amounting to approximately \$212 million, while agricultural exports amounted to \$67 million, which represents nearly 7% of total exports.

The percentage of the agricultural sector's contribution to the gross domestic product decreased to approximately 13% in 2020, compared to 17.3% in 2019. Agriculture still provides employment for more than 10% of the labor force in the Palestinian territories, which serves as a primary and secondary source of income for many Palestinians, as agriculture heavily relies on family labor. It is a safety net for employment

and an indispensable source of food in difficult times. In recent times, Palestinian agricultural activity has contributed 7% to the GDP. The value of Palestinian agricultural commodity exports constituted 11.25% of the total value of exports in 2018¹⁴.

Water sector in Palestine

The water sector has been important for the emergence and advancement of civilizations since ancient times. This is because water attracts individuals and groups, paving the way for the establishment of society and the development of its foundations through the establishment of population centers near natural water resources. Human needs for water extend beyond personal use, encompassing areas such as transportation, agriculture, industry, animal husbandry, and others. As a historically agricultural country, Palestine has also paid significant attention to the water sector¹⁵.

Water resources in Palestine

There are two important sources of water in Palestine:

- **Groundwater**

Groundwater (GW) is the primary source of water in Palestine, obtained from wells or springs. The total available quantity of groundwater is estimated to be 100 million m³/year in the West Bank and 189 million m³/year in the Gaza Strip, with a part of the Coastal Aquifer present in the Gaza Strip. GW accounts for 95% of the water supply in Palestine, while precipitation is the primary source of groundwater and surface water resources in the occupied Palestinian territories. The precipitation in the occupied Palestinian territories shows significant spatial and temporal variability, with the average annual precipitation being 450 mm/yr in the West Bank and 327 mm/yr in the Gaza Strip. Groundwater is formed in three major drainage aquifers: the Western, the Northeastern, and the Eastern Aquifers.

Western Aquifer Basin: The Western Aquifer Basin is the largest aquifer in the West Bank and has a

¹² The State of Palestine, Ministry of Agriculture, Nov.2016.

¹³ United Nations, 2022.

¹⁴ Palestinian Central Bureau of Statistics, 2019.

¹⁵ Añaños Bedriñana, Ruiz Carnero y Rodríguez Martín, 2023.

sustained production of between 362 and 400 MCM per year. However, Israel extensively exploits the basin, occupying approximately 340 to 430 MCM per annum and sometimes exceeding 520 MCM per annum, while in 2012, Palestinians consumed only 28 MCM through wells. The Northeast Aquifer Basin has most of its recharge area located in the West Bank and has an annual sustainable production of 100-145 MCM. However, Israel uses the aquifer at a rate of 103 MCM per year, while Palestinians used about 23 MCM per year of water from wells and springs in the basin in 2012.

The Eastern Aquifer's entire recharge area is in the West Bank, giving Palestinians the right to control the water without sharing it with Israel. However, Israel still uses approximately 50 million cubic meters of water in the aquifer, in addition to 100 MCM per year from Dead Sea springs under Israeli control, despite Palestinian claims to the contrary.

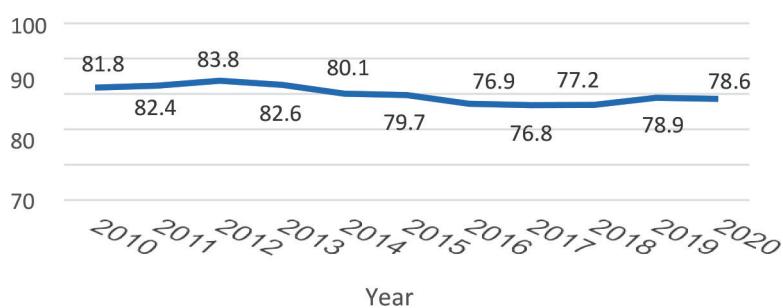
Gaza Coastal Aquifer is the only source of water in the Gaza Strip. The aquifer is extremely limited in volume, with annual recharge of 55-60 MCM. In 2012, Palestinians in the Gaza Strip consumed about 185 MCM. Excessive pumping has lowered the water table below sea level, causing saline intrusion in many areas. Only about 53 MCM of well and spring water were used in 2012. Estimated sustainable yield for the basin is between 145 and 185 MCM.

According to the Palestinian Central Bureau of Statistics, 79% of the available water is taken from groundwater data, which showed that the percentage of surface and groundwater exploitation from the available water during 2020 was high, with an average of 79% (Figure 2).

On the other hand, the amount of water pumped from Palestinian wells in the West Bank in 2020 amounted to 108.8 million cubic meters from the eastern aquifer, the western aquifer, and the northeastern aquifer.

Surface Water: The Surface water resources in historical Palestine are concentrated in the northern and central parts of the region, gradually decreasing as we move towards the south, where they are almost non-existent. These water sources discharge in three main directions: towards the Mediterranean Sea, towards the Jordan Valley and the Dead Sea, and towards Wadi Araba and the Gulf of Aqaba, as well as other directions. The most important sources of surface water in historical Palestine are the Jordan River and its tributaries, Lake Tiberias, Lake Hula, and the main streams of the valleys. The quantity of water flowing into the Lower Jordan River and discharging into the Dead Sea was estimated to be 1400 MCM/y¹⁶, but this amount has dramatically decreased over the past six decades and is presently no more than 30 MCM/y. However, due to the Oslo Accords of 1994, the Palestinians are not entitled to benefit from the waters of the Jordan River¹⁷. In the West Bank, a total of 383 Palestinian wells are connected to groundwater systems, but 119 of these are either not pumping, abandoned, or in need of remediation. As of 2012, the total volume of water withdrawn from wells was approximately 64 million cubic meters (MCM) per year, of which 36 MCM was for domestic use and 28 MCM was for agricultural use. In Gaza, the total amount extracted in the same year was about 185 MCM, of which about 102 MCM was used for municipal and domestic use, while 83 MCM was used for agriculture.

Figure 2. Percentage of extracted surface and groundwater from available water, 2010-2020



Source: Palestinian Central Bureau of Statistics, 2023b.

¹⁶ Palestinian Water Authority, 2017.

¹⁷ Palestinian Water Authority, 2012.

It should be noted that there are 39 Israeli wells, with an average annual extraction of about 54 million cubic meters. Israel uses more than 500 wells within the Green Line (mainly in the Western Basin). These wells extract more than the annual recharge rate of all aquifers, leaving very limited quantities for Palestinian use¹⁸.

• Non-traditional water sources

The Water Authority has implemented methods to bridge the gap between water supply and demand due to the increased demand for water resources and the Israeli occupation policy. These methods include:

Desalinated water: Currently, there is only one desalination plant in the central Gaza Strip with a capacity of 600 m³/day. However, there are plans to expand the plant's capacity to 2,600 m³/day and build a regional seawater desalination plant with an annual capacity of 1 million m³, which will reach 129 m³ per year by 2035. There are also small-capacity private desalination plants in the Gaza Strip. Treated wastewater reuse: There is limited activity in the Gaza Strip and the West Bank to reuse treated wastewater, with only pilot projects in some areas. The total amount of sewage reuse is about 1 million cubic meters per year in the Gaza Strip.

The reality of water sector under Israeli occupation shadow

One of the main consequences of the 1967 occupation was Israel's annexation of much of the headwaters of the Jordan River where a water pump was installed in Lake Kinneret (the source of the Dead Sea). Pumping annually 400 million cubic meters of water, in addition to the installation of an Israeli national carrier that transports water (80% for agriculture, 20% for drinking) from northern to southern Israel¹⁹, resulting in the loss of a large amount of available water supplies for Jordan. The main problem regarding international water resources in the region has been Israel's strict policy of restricting water allocation in the West Bank and Gaza Strip, thus depriving the Palestinians of adequate water. About 40% of the groundwater that the State of Israel relies on and more than a quarter of its annual sustainable water production originate in the West

Bank. Israel has developed the water resources it has access to and has established a national water company, Mekorot. Which transports water from existing sources of supply to various demand centers for Israeli agricultural, municipal, and industrial customers. After the end of the 1967 war, Israel tightened its grip on water resources, developed wells throughout the West Bank, and established the Mekorot MEMS network, which contributed to the abolition of the Palestinians' water rights in the West Bank. The amount of water provided by Mekorot to the settlements is unofficially estimated at about 75 million cubic meters, of which 44 million cubic meters are produced from controlled wells²⁰.

About 11 percent of the Jordan River Basin is located in the West Bank. In the Unified Jordan Valley Water Plan of 1955, the annual Palestinian quota of 257 MCM was considered part of the 774 MCM of the Jordanian quota. Since 1967, areas along the western side of the river have been expropriated and declared military security zones. Prior to the 1967 occupation, Palestinian farmers owned about 150 pumps in the Jordan River, pumping about 30 million cubic meters annually. The occupying power has destroyed many of these pumps²¹.

As a result, of Israel's control over most of the Palestinian water resources in the West Bank and Gaza Strip, the Palestinian water deficit and need have increased. To address this need, the water supply in the Palestinian territories is largely determined by agreements negotiated with Israel for groundwater extraction (internal resources) and water imports. In 2016, the Palestinians purchased about 79 cubic meters of water from the Israeli occupation and, within the framework of the sea transportation project between the Red and Dead Sea, agreed to obtain an additional 32 cubic meters, with an additional 34 cubic meters requested. If these deals are agreed upon and implemented, the Palestinians will buy about 145 cubic meters from Mekorot. The Israeli bulk water supply company. According to the Israeli Water Authority, the share of the Palestinian Authority and the State of Jordan constitutes 6% of the volume of total water consumption in Israel, which amounted to more than 2,340 million cubic meters in 2016²².

In the West Bank, the total arrears from the cost of purchasing water from Mekorot in 2017 amounted to about 335 million US dollars. In 2016, the Israeli Finance Minister deducted US\$94 million from clearing

¹⁸ World Health Organization, 2015.

¹⁹ The Knesset Research Israel center, 2018.

²⁰ The World Bank, April 2009, Daibes-Murad1, 2004.

²¹ United Nations Conference on Trade and Development 2015.

²² The Israeli Water Authority, 2012.

Table 1. Selected Indicators for Water Statistics in Palestine, 2010-2020

| Indicator | Year | | | | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 2020 | 2019 | 2018 | 2017 | 2016 | 2015 | 2014 | 2013 | 2012 | 2011 | 2010 |
| Annual Available Water Quantity | 448.4 | 417.9 | 389.5 | 375.2 | 363.6 | 365.3 | 342.7 | 365.7 | 349.2 | 323.9 | 331.1 |
| Annual Pumped Quantity from Groundwater Wells | 299.1 | 289.0 | 274.2 | 264.5 | 251.6 | 250.5 | 246.3 | 262.9 | 253.3 | 245.5 | 244.0 |
| Annual Discharge of Springs Water | 53.3 | 40.6 | 25.5 | 23.5 | 29.0 | 40.7 | 28.2 | 39.5 | 39.3 | 21.4 | 26.8 |
| Quantity of Water Supply for Domestic Sector | 232.6 | 227.3 | 214.0 | 213.2 | 210.2 | 214.9 | 191.3 | 198.4 | 199.9 | 185.5 | 178 |
| Daily Consumption Rate per capita (liter/capita/day) | 84.2 | 81.9 | 87.3 | 88.3 | 83.0 | 82.2 | 79.3 | 79.1 | 77.0 | - | - |
| Desalinated Drinking Water ²³ | 5.7 | 4.1 | 4.1 | 4.0 | 3.9 | 3.9 | 4.7 | - | - | - | - |
| Annual Quantity of Water Purchased from Israeli Water Company (Mekorot) | 90.3 | 84.2 | 85.7 | 83.2 | 79.1 | 70.2 | 63.5 | 63.3 | 56.6 | 57.0 | 60.3 |

Source: Palestinian Central Bureau of Statistics, 2023c.

revenues owed to the Palestinian Authority for unpaid Mekorot water and wastewater treatment bills. In 2017, the deductible increased by 10 percent²³.

Article 40 of the Oslo II Accords contains provisions on water and sanitation, recognizing the unspecified water rights of the Palestinians and returning some water resources and supply responsibilities in the West Bank to the Palestinian Authority, including the following:

1. Laying down the basics of governance and supervising its implementation.
2. Allocating specific quantities from the three aquifers in the West Bank located under both regions, noting that the share allocated to the Palestinian West Bank is about a quarter of the amount allocated to Israel and the settlements.
3. Estimated future needs for the Palestinian West Bank at 70-80 MCM.
4. Additional supplies in the meantime from new wells and from Mekorot.

Israel continues to implement policies and practices that appropriate and control Palestinian water resources, resulting in an unequal and discriminatory distribution of water resources. These policies benefit Israeli citizens living in Israel and those living in West Bank settlements, while preventing Palestinians from accessing and developing resources, thus undermining

their right to self-determination. These efforts are enforced by Israeli military orders that transfer power over water resources and management to the occupation authorities (table 1).

Upon examining the table above, it can be observed that the daily per capita water consumption increased from 77 to 84 liters per person per day between 2012 and 2020. However, due to water scarcity and Israeli restrictions on access to resources, Palestinians are forced to purchase 20% of their available water from Israel's Mekorot Water Company. In 2020, they bought 90.3 MCM of water, which accounts for 20% of Palestine's water availability (448.4 MCM). Additionally, 53.3 MCM of water was taken from Palestinian water sources, 299.1 MCM was extracted from groundwater wells, and 5.7 MCM of desalinated water was obtained, making up 1% of the water supply. In the Gaza Strip, 201.8 MCM of water is contaminated and not suitable for drinking, while only 246.6 MCM of water is fit for domestic use, including purchased and desalinated water.

Agricultural insurance in Palestine

The agricultural sector in Palestine faces damages because of a wide range of risks, which can be classified into two categories. The first category includes political and institutional risks, while the second category includes market and production risks.

The main source of political and institutional risks is the Israeli occupation, with a focus on Area

²³ World Bank, 2017.

C, which includes restrictions on the movement of goods and people, land confiscation, wall construction, appropriation of water and resources, settler violations, and restrictions on agricultural investments and economic activities. Palestinians have no control over more than 63% of their land (called Area C) and no more than 80% of their water resources in the West Bank. In the Gaza Strip, Palestinians are still suffering from the repercussions of the last three wars against them in 2009, 2012, and 2014, which devastated large swathes of agricultural land, damaged the already weak agricultural infrastructure, and left farmers and all citizens of the Gaza Strip in a crisis. In addition, limited agricultural resources and drinking water, as well as the limited cultivated areas in the Gaza Strip, exacerbate the situation. The Gaza Strip has the potential to have the highest population density in the world, with two million people living in 365 square kilometers.

Market risks mainly consist of exposure to price volatility and inability to access outlet markets due to trade restrictions. Production risks include climatic events, drought, floods, low and high temperatures, as well as pests and diseases that affect the production activities of livestock and agricultural crops²⁴.

From the foregoing, we note that any insurance company cannot cover the political risks that involve the practices of the occupation because they are risks that cannot be predicted. In addition, they destroy the various factors of agricultural production, the most important of which are land and water. As for market risks, diseases, and temperature changes, they can be mitigated or avoided by improving technology.

Despite the obstacles that prevent the establishment of agricultural insurance companies, there are attempts by the Palestinian Authority and international organizations that have resulted in the establishment of the Risk Prevention and Agricultural Insurance Fund. This fund deals with the risks faced by Palestinian farmers, including risks from the Israeli occupation such as land confiscation and water resource scarcity, by compensating them. In addition, the fund performs the following functions in order to develop agricultural insurance in Palestine:

1. The fund has set up a range of projects that aim to gather everything related to agricultural risk man-

agement, disaster risk reduction, and agricultural insurance.

2. It brings Arab and foreign expertise in the fields of agricultural insurance, dispatches local staff for external training, and builds the fund's capabilities in technological applications in agricultural insurance.
3. The fund develops a system for agricultural insurance that regulates all aspects related to agricultural insurance and takes into account the characteristics of the Palestinian agricultural sector and what is compatible with it.
4. The fund creates an investment environment that supports the development of successful agricultural insurance through the participation of the government in bearing the burdens of insurance through the role of the fund and the establishment of companies or branches of companies specialized in agricultural insurance²⁵.

Conclusion

Agricultural insurance in Palestine faces several obstacles that have prevented its development and resolution until now, including the lack of administrative, organizational, technological, and technical capabilities. Additionally, the agricultural insurance companies in Palestine cannot bear or expect the risks involved, particularly due to the practices of the occupation, which involve the destruction of two essential elements of the agricultural sector: land and water. Israeli restrictions prevent Palestinians from utilizing more than one-third of the area in the West Bank. Furthermore, the Israeli occupation contributed to the reduction of Palestinian water resources by controlling various springs and classifying them as lands (c, according to the 1994 Paris Agreement). Additionally, it restricts the freedom of Palestinians to dig underground wells by obliging them to reach only a specific depth available to them.

Agricultural insurance in Palestine faces several obstacles that have contributed to preventing its development and getting out of the bottleneck until this moment, including the lack of administrative, organizational, technological and technical capabilities, in addition to the great danger that agricultural insurance companies in Palestine cannot undertake. It bears or expects, especially because of the practices of the

²⁴ European Commission, 2020.

²⁵ <https://gatepadrif.com/>, 2023.

occupation through the destruction of two of the most important elements of the agricultural sector (land, water). Israeli restrictions prevent Palestinians from exploiting more. One-third of the area of the West Bank. On the other hand, the Israeli occupation contributed to the reduction of Palestinian water resources by controlling various springs and classifying them as lands (c, according to the 1994 Paris Agreement), in addition to restricting the freedom of Palestinians to dig underground wells by obliging them to the depth available to them.

Bibliography

Añaños Bedriñana, K.G.; Ruiz Carnero, M. and Rodríguez Martín, K. A. 2023: El derecho humano al agua en la Franja de Gaza (Palestina), desde una perspectiva de género y en el marco de los Objetivos de Desarrollo Sostenible. *Agua y Territorio / Water and Landscape* (21), 53-68. <https://doi.org/10.17561/AT.21.6503>

Barghouthi, A.H.M. 2009: Agricultural Insurance in Palestine: Current Conditions and Recommendations. Jerusalem. (Palestine), Palestine Economic Policy Research Institute.

Daibe-Murad, F. 2004: Water Resources in Palestine A Fact Sheet and Basic Analysis of the Legal Status. Untitled Document (miftah.org). Seen the 25th of January, 2023.

European Commission. 2020: Project Title: Building the Palestinian Agricultural Insurance Systems and Services. [Building_the_Palestinian_Agricultural_Insurance_Systems_and_Services.pdf](http://bmeia.gv.at) (bmeia.gv.at). Seen the 26-1-2023.

Fomunyam, D.K. 2019: "Emerging Technologies in Agriculture Engineering". *Internacional Journal of Mechanical Engineering and Technology*, 10, 07, 127-128. <http://iaeme.com/Home/issue/IJMET?Volume=10&Issue=7>

Knesset Research Israel Center. 2018, February 25: Israeli Water Sector. Israel's Water Sector—Key Issues (knesset.gov.il). Seen the 10th of April 2023.

Coalition for Integrity and Accountability (AMAN). 2019: Integrity Environment in the Palestinian Agricultural Risk Reduction and Insurance Fund – Ramallah, Palestine. [pad-final-1578924308.pdf](http://aman-palestine.org) (aman-palestine.org). Seen the 3rd of January, 2023.

Palestinian Central Bureau of Statistics. 2015: *Performance of the Palestinian Economy, 2014*. Ramallah – Palestine.

Palestinian Central Bureau of Statistics. 2015: *Performance of the Palestinian Economy, 2017*. Ramallah – Palestine.

Palestinian Central Bureau of Statistics. 2015: *Performance of the Palestinian Economy, 2019*. Ramallah – Palestine.

Palestinian Central Bureau of Statistics. 2019.

Palestinian Central Bureau of Statistics. 2023a: Agricultural census. Agriculture Census (pcbs.gov.ps). Seen the 10th of January, 2023.

Palestinian Central Bureau of Statistics. 2023b: Evaluating report 2019, 2022. PCBS | videos. Seen the 11th of January 2023.

Palestinian Central Bureau of Statistics. 2023c: The performance of the Palestinian economy 2020. PCBS | PCBS &PMA: The Performance of the Palestinian economy during 2020, as well as the economic forecasts for the year 2021. Seen the 12th of January 2023.

Palestinian Monetary Authority. 2016: Summary Palestine in Inclusion Financial of Study.

Palestinian Water Authority. 2012: Status Report of water resources in the occupied state of Palestine. Annual caver final (pwa.ps).

Palestinian Water Authority. 2017: Water resources in Palestine.

Raghad Azzam Injass, T. S. 2017: The Paris Protocol and the Palestinian Economy: New Evidence. *South East Asia Journal of Contemporary Business, Economics and Law*, 12, 3, 18-24. ECON-301.pdf (seajbel.com)

Sigma. 2020: World Insurance: Regional review 2019, and outlook 2020: Sigma extra. 4,2020. sigma-4-2020-extra-complete.pdf (swissre.com). Seen the 5th of January 2023.

The Israeli Water Authority. 2012: The Water Issue Between Israel and the Palestinians. [The_Water_Issue_Between_Israel_and_the_Palestinians \[356\366\341\372\340\351\356\345\372\] \(www.gov.il\)](http://www.gov.il). Seen the 25th of April 2023.

Technology Vision for insurance. 2020: Executive Summary. Accenture. Abizer Rangwala, A. S. 2020: Technology vision for insurance. Seen the 24th of January, 2023.

State of Palestine, Ministry of Agriculture. 2016: National Agricultural Sector Strategy (2017-2022). English Strategy 2017-2022.pdf (unccd.int). Seen the 9th of January 2023.

United Nations Conference on Trade and Development (UNCTAD). 2017: Developments in the Economy of the Occupied Palestinian Territory. Report on UNCTAD Assistance to the Palestinian People: Developments in the Economy of the Occupied Palestinian Territory. Seen the 9th of January 2023.

United Nations Conference on Trade and Development (UNCTAD). 2015: The Besieged Palestinian Agricultural Sector. The Besieged Palestinian Agricultural Sector. Seen the 8th of January 2023.

United Nations. 2022: Report on UNCTAD assistance to the Palestinian people: Developments in the economy of the Occupied Palestinian Territory. Report on UNCTAD assistance to the Palestinian people: Developments in the economy of the Occupied Palestinian Territory. Seen the 7th of January 2023.

World Bank. 2009: Assessment of Restrictions on Palestinian Water Development. Water Restrictions Report 18Apr2009 cover-less.docx (un.org) Seen the 6th of January.

World Bank. 2017: Securing Water for Development in west bank and Gaza strip. Securing Water for Development in West Bank and Gaza (worldbank.org). Seen the 6th of January.

World Health Organization. 2015: Water Scarcity and Health Concerns in Palestine. Microsoft Word - Water scarcity and health in Palestine_Final.doc (pniph.org). Seen the 5th of January 2023.