Status of the Environment in the Occupied Palestinian Territory

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Applied Research Institute - Jerusalem (ARIJ)

Funded by
Swiss Agency for Development and Cooperation SDC

2007

ISBN 978-9950-304-00-0
P .O .Box 860, Caritas Street
Bethlehem, Palestine
Tel: +970 – 2 – 2741889 Fax: +970 – 2 – 2776966
Website: www.arij.org

ACKNOWLEDGEMENT

The Applied Research Institute –Jerusalem (ARIJ) hereby expresses its deep gratitude to the Swiss Agency for Development and Cooperation (SDC) for providing a grant to carry out the research study entitled "Status of the Environment in the Occupied Palestinian Territory 2007".

ARIJ would like to acknowledge the Environmental Quality Authority, Palestinian Water Authority, Palestinian Central Bureau of Statistics, Ministry of Transportation, Ministry of Health and Palestinian Energy and Natural Resources Authority, Local Authorities for their cooperation with the research study team in acquiring and providing the required data pertinent to the study. ARIJ would also like to acknowledge all other Palestinian governmental and non-governmental agencies and universities for their inputs during the workshop that was organized to discuss the first draft of the study .

Team Leader:
Dr. Jad Isaac

Editors:
Dr. Hilmi S. Salem
Jane Hilal
Roubina Ghattas

Contributors:
Abeer Safar
Ahmad Al-Atrash
Alice Gray
Anwar Qabaja
Elias Abu Mohour
Enas Bannourah
Ghassan Darwish
Ghassan Shahin
Hiyam Hzaineh
Jane Hilal
Khaled Sadeh
Lina Khair
Mohamad Sbeih
Dr. Mohamed Alsalimiya
Nachy Kanfer
Nader Hrimat
Owen Powell
Phil Jones
Roubina Ghattas
Suhail Khaliliah
Abeer Khair
Ehab Zaghmout
Fadi Isaac
Fuad Ishaq
George Khair
Issa Zboun
Jeries Shomali
Manal Daoud-Badra
Sami Rishmawi

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List of Abbreviations:

Abbreviation	Full Name
AAUJ	American Arab University of Jenin
AIDS	Acquired Immune Deficiency Syndrome
APC	Arab Potash Company
APIS	Agricultural Projects Information System
ARIJ	Applied Research Institute-Jerusalem
BG	British Gas
CAMP	Coastal Aquifer Management Plan
CBD	Convention on Biological Biodiversity
CBOs	Community Based Organizations
CCC	Consolidated Contractors Company
CEOHS	Center for Environmental and Occupational Health Sciences, Bir-Zeit University
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CMWU	Coastal Municipalities Water Utility
CPB	Cartagena Protocol on Biosafety
CPNP	Children for the Protection of Nature in Palestine
DEC	Dietary Energy Consumption
DSS	Decision Support System
EIA	Environmental Impact Assessments
EIS	Environment Impact Statement
EPRI	Environmental Protection and Research Institute
EQA	Environmental Quality Authority
EU	European Union
FAO	Food and Agriculture Organization
FIGIS	Fisheries Global Information System
FIVIMS	Food Insecurity and Vulnerability Information Mapping System
GCMs	Global Climate Models
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GIS	Geographic Information System
GNI	Gross National Income
GNP	Gross National Product
GTZ	German Technical Cooperation
HIV	Human immunodeficiency virus
ICJ	International Court of Justice
IMR	Infant Mortality Rate
IOF	Israeli Occupation Forces
IPCC	Intergovernmental Panel on Climate Change
IPCRI	Israeli-Palestinian Center for Research and Information
JCspd	Joint Councils for Services, Planning and Development

JWC	Joint Water Committee
JWU	Jerusalem Water Undertaking
KfW	German Development Bank (Kreditanstalt für Wiederaufbau)
kwh	Kilo Watt Hour
LPG	Liquefied Petroleum Gas
MCM	Million Cubic Meters
MDER	Minimum Dietary Energy Requirements
MDGs	Millennium Development Goals
MEAs	Multilateral Environmental Agreements
MEna	Ministry of Environmental Affairs
MLG	Ministry of Local Government
MOA	Ministry of Agriculture
MOF	Ministry of Finance
MOH	Ministry of Health
MOHE	Ministry of Education and Higher Education
MOP	Ministry of Planning
MoPIC	Ministry of Planning and International Cooperation
MOT	Ministry of Transport
NARC	National Agricultural Research Center
NEAP	National Environmental Action Plan
NGOs	Non-Governmental Organizations
NIS	New Israeli Shekel
NOAA	National Oceanic and Atmospheric Administration
NPAHR	Palestinian National Plan of Action for Human Rights
NSGB	National Seed Gene Bank
NWC	National Water Council
NWP	National Water Policy
OCHA	Office for the Coordination of Humanitarian Affairs
OPT	Occupied Palestinian Territory
PARC	Palestinian Agricultural Relief Committee
PCBS	Palestinian Central Bureau of Statistics
PCES	Palestinian Consumption and Expenditures Survey
PDP	Palestinian Development Plan
PECDAR	Palestinian Economic Council for Development and Reconstruction
PES	Palestinian Environmental Strategy
PHC	Primary Health Care
PHG	Palestinian Hydrology Group
PIES	Palestinian-Israeli Environmental Secretariat
PLC	Palestinian Legislative Council
PLF	Palestinian Labour Force
PLO	Palestinian Liberation Organization

PMU	Project Management Unit
PNA	Palestinian National Authority
POPs	Persistent Organic Pollutants
PSPN	Palestinian Society for the Protection of Nature
PWA	Palestinian Water Authority
RCMs	Regional Climate Models
TDEC	Total Dietary Energy Consumption
TFR	Total Fertility Rate
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNRWA	United Nations Relief and Works Agency
USA	United States of America
USAID	United States Agency for International Development
USD (US$)	United States Dollar
WaSH MP	Water and Sanitation Hygiene Monitoring Project
WBWD	West Bank Water Department
WCNH	World Cultural and Natural Heritage
WFP	World Food Programme
WHO	World Health Organization
WSSA	Water and Sanitary Services Assessments
WWTP	Wastewater Treatment Plants

Preface

Palestine, as it stands today, consists of two physically separated land masses, namely the West Bank (including East Jerusalem) and Gaza Strip with a total area of 5,661 km^2 and 362 km^2, respectively. The once-fertile heights of Palestine have been denuded; barren lands and deserts have replaced forests and green plains. Desertification and soil erosion are evident, particularly in the Eastern Slopes of the West Bank. Polluted and salty water runs now in the Jordan River more than ever. The Dead Sea has sunk so low that it is now two separated seas and still dropping.

Palestine is characterized by the presence of two contradictory planning schemes that aim at exploiting its natural resources to serve two peoples: these are the endogenous Palestinian population and the Israeli settlers and army, which has been controlling the area since 1967. The fragile Palestinian environment has been the first casualty of this reality. It has been exposed to pressures ensuing from the practices of the Palestinian population, on the one hand, and from the practices of the Israeli Occupation, on the other hand, which have significantly contributed to changing the environmental features of the Occupied Palestinian Territory (OPT).

Lack of sovereignty over land and natural resources has denied the Palestinian people their rights to regulate land use and to manage the utilization of their own resources, without exceeding the carrying capacity of land. Without ability to regulate land use over a contiguous piece of land, natural ecosystems can not be maintained; the status of the environment can not be properly monitored; and environmental protection can not be implemented. On the other hand, the plans of the Israeli Occupation (the controlling power in the area) in the OPT have been geared by political factors, aiming at grabbing as much as possible of the Palestinian land to implement the Israeli colonizing strategy and to change the demographic characteristics.

Aerial photography of the region clearly show two contradictory types of built-up areas: the first is the Palestinian villages that are often built on non-fertile soil and promote organic extension of the landscape; and the second is the Israeli settlements that are not built in harmony with nature, illegally overlying Palestinian confiscated agricultural lands on hill tops in particular strategic areas such as the Jordan Valley, the West Bank westerns edges and the Jerusalem area. Currently, more than 207 Israeli settlements are scattered all over the West Bank, including East Jerusalem. These settlements accommodate more than 480,000 Israeli settlers. The features of housing inside the Israeli settlements differ from those inside the Palestinian built-up areas. The settlements include brick roofed villas, grassy areas and swimming pools, whereas the Palestinian houses are built with flat roofs that are traditionally used for rainwater harvesting and are often surrounded by backyard farms to meet the household needs for agricultural products. Other features, which can be distinguished include the Israeli industrial zones, military bases, and roadblocks that have been implanted all over the OPT by the Israeli Occupying Authorities. The most recent "exotic" body that was erected in the West Bank is the Israeli Segregation Wall, which has brought about major challenges to the viability, sustainability, and conservation of resources, ecosystems and landscapes.

It is obvious that the Israeli Occupying Authorities have focused on exploiting the Palestinian natural resources to ensure a good standard of living for the Israeli settlers. They have utilized the Palestinian water resources far and beyond any rational and equitable allocation system. They have established a comprehensive water network covering all parts of Israel and another efficient water network within the OPT. They have imposed restrictions that have limited Palestinians' water use at all sectors of life. And, last but not least, they have hindered the economic development of the Palestinian people and damaged their physical environment.

Furthermore, the Israeli Occupying Authorities have badly neglected the management of waste in the OPT. The geographical discontinuity, created at the lands under Palestinian control through the implementation of the Israeli Segregation Plans and the construction of the Segregation Wall, has hindered the implementation of several centralized projects related to waste management. The number of the uncontrolled solid waste dumping sites increased from 89 to 161. Untreated sewage streams are flowing in wadis without any restriction. These pollution sources are causing visual distortion to the landscape and aesthetic value of the living and natural environment as well as causing health problems. They have also exacerbated the land deterioration problem. The existence of accessible and inaccessible areas for Palestinians has also made the management and conservation of natural resources a very difficult job. The prolonged years of the Israeli Occupation have converted large areas in the Palestinian Territory to deserts. Indicators of desertification appear clearly in the Eastern Slopes, which are characterized by steep slopes that have limited the agricultural activity in such zones to animal grazing. The closure of 85% of these zones by the Israeli Occupying Authorities for military purposes, has led to severe overgrazing of the remaining area accessible to the Palestinian herders. Overgrazing has resulted in the loss of the vegetation cover, soil erosion problems, and intensive desertification.

The practices of the Israeli Occupation and control used by the Israeli Authorities have systematically hindered the development of the Palestinians, contributed to poverty increase among them, damaged the environment in the process and resulted in major physical impediments towards accomplishing sustainable development in the OPT. Environmental problems, such as land degradation, deterioration of biodiversity, depletion of water resources, deterioration of water quality, air pollution, etc. have dramatically accelerated during the ongoing Israeli Military Occupation since 1967. The case of the OPT strongly illustrates the often negative relationship between occupation and environmental degradation (Figure 1). All the facts indicate that the Palestinian environmental rights have been badly violated by the Israeli Occupiers specially during the so-called "peace process".

The status of the environment in the OPT has received much less attention in the continuing debate, in regard to the Israeli Occupation. This is despite the fact that the status of environment has a fundamental role in the ability of a Palestinian state to be viable, since it provides the physical context in which society exists and it determines the extent at which society is sustainable. Restrictions on the available resources, poor management and unsustainable practices have resulted in the radical transformation of the Palestinian environment, degradation of its natural ecosystem, and depletion of its resources. When the Palestinian people are struggling for survival, it is difficult for them to think about the environment, but the environmental damages caused by the conflict will require a lot of effort, time and money to be mitigated. Moreover, with the fact that the future of the OPT is uncertain, it is increasingly apparent that the environmental situation will continue to deteriorate placing by that massive restrictions on the capacity for sustainable development, rendering a Palestinian state unviable and highly unstable. Accordingly, it is believed that mutual collaboration from all stakeholders, as well as joint environmental management on the basis of good will should be achieved, since environmental problems do not recognize political borders or geopolitical boundaries and many of them are transboundary.

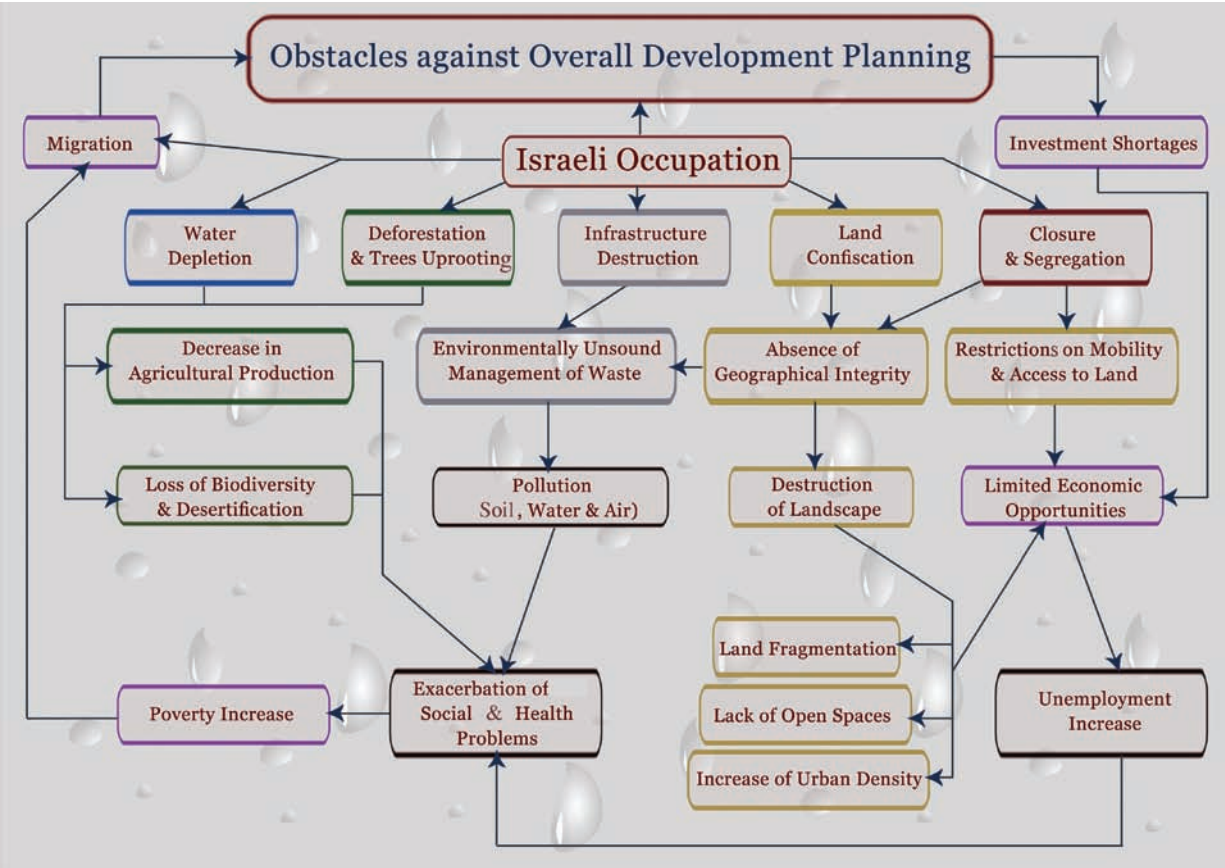


Figure 1: The organic relationship existing between environmental degradation in the OPT and the Israeli Occupation

In 1997, the Applied Research Institute – Jerusalem (ARIJ) published a comprehensive "Environmental Profile" for the West Bank entitled, 'The Status of the Environment in the West Bank". The profile was prepared based on sound environmental information integrated into an Environmental Information System (EIS). It included an overall description of the state of the environment and the actions that should be considered to protect the Palestinian environment. The developed EIS was transferred to the Palestinian National Authorities to provide them with the basic information needed to develop national strategies and policies, in order to foster sustainable development in the OPT. It was, however expected that the national authorities would have cooperated and updated the relevant data presented in the EIS and produced an updated version of the "Environmental Profile" especially after the construction of the Segregation Wall, which has caused critical environmental problems and negatively affected the management of the environment at all levels. Regrettably, ten years (since 1997) passed following the preparation of the Profile and this has not been achieved.

Accordingly, ARIJ decided to take the initiative of harmonizing the new and updated physical, environmental and socio-economic data available in its databank, bridging the gaps to update the EIS, and providing a comprehensive assessment of the state of the environment in the OPT. This time the assessment was carried out for both the West Bank and the Gaza Strip, in order to bring into the forefront the political realities that have impacted the potential for sustainable development in the OPT. ARIJ is proud to present the updated environmental profile for the OPT, entitled "The Status of the Environment in the OPT - 2007", which is developed with the support of the Swiss Agency for Development and Cooperation (SDC). This is the first time a Status of the Environment Report for the OPT as a single territorial unit is published. It is hoped that the next report will be published by the State of Palestine after its establishment.

This Profile provides a narrative, statistical and cartographic description of the current environmental status in the OPT and shows the trends of the major environmental indicators over the period from 1997 till 2007. It also includes a list of recommendations to monitor and control further environmental degradation, and to carry out restoration actions in environmental hot spots. The Profile is divided into three main parts: Part One "Land, Demography and Economic Sectors"; Part Two "Environmental Challenges"; and Part Three "National and International Aspects". The Profile, as well as the updated EIS, will be posted on ARIJ Website, in order to make them accessible to decision makers, the public and all who can benefit from them. It is worth mentioning that a workshop targeting all the Palestinian stakeholders was organized on May 09, 2007 to present and discuss the first draft of the Profile. The workshop was fruitful and revealed the comments and remarks of the participants, which have been taken into consideration in the final Profile. Further comments, remarks and suggestions are welcomed.

Dr. Jad Isaac
General Director

Bethlehem - West Bank
June 09, 2007

Part One

Land, Population and Economic Sectors

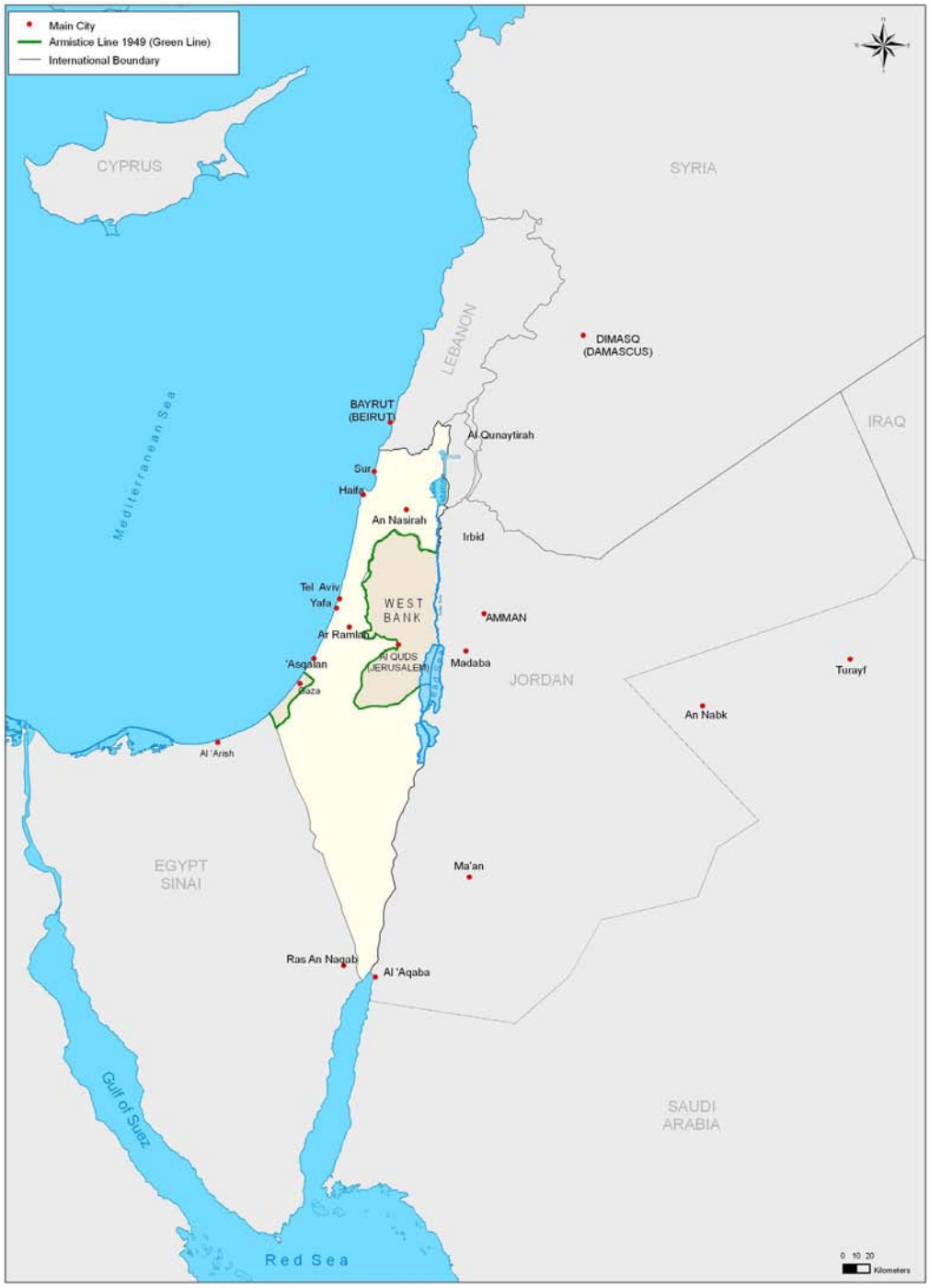
Chapter One

1

Physical Characteristics

1.1 Location

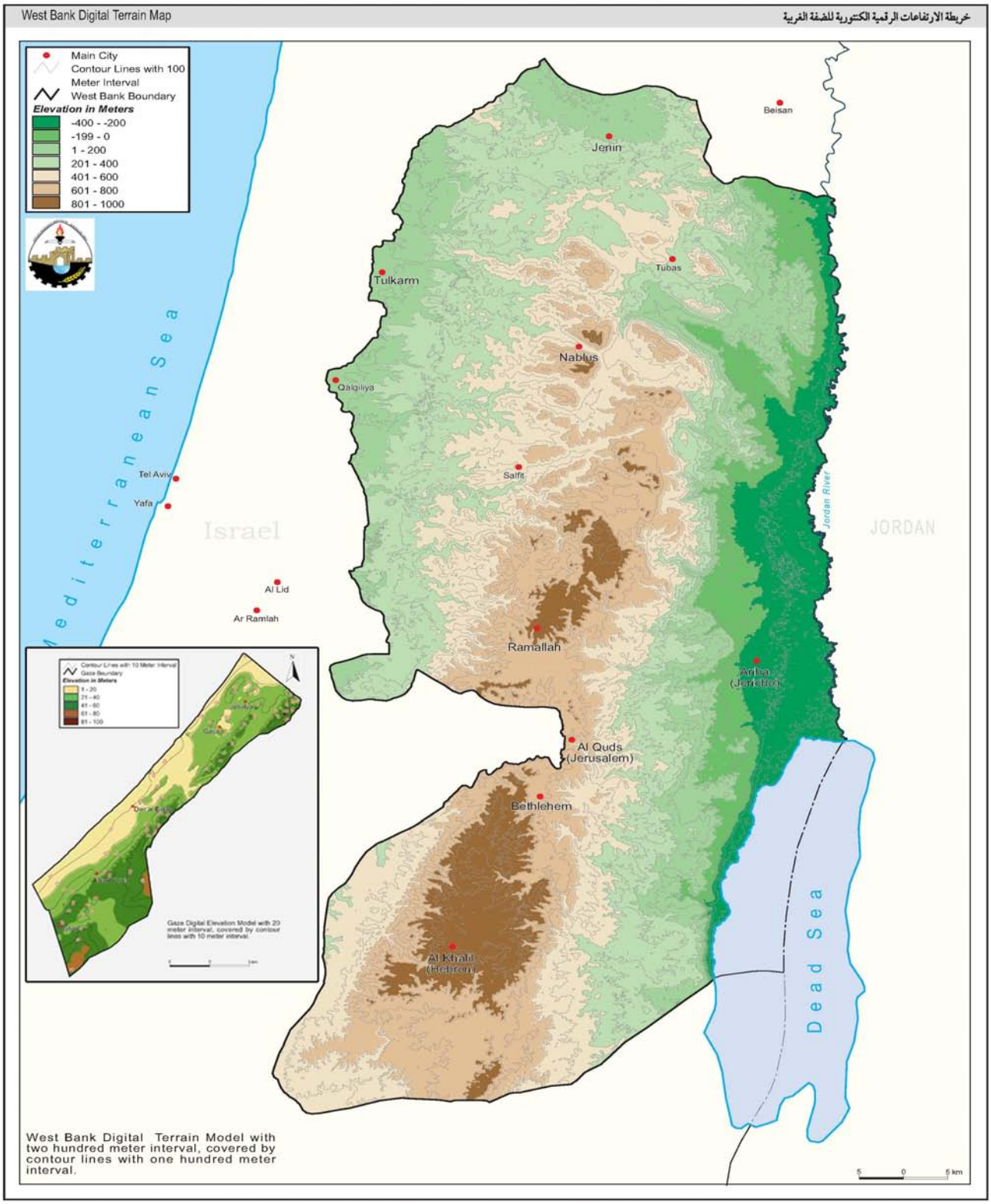
The Occupied Palestinian Territory (OPT) consists of two physically separated landmasses: the West Bank (including East Jeruslam) and the Gaza Strip. The West Bank is surrounded by Israel on the west, north, south; and the Jordan River on the east (Map 1.1). It is divided into Eleven Governerates Jericho, Ramallah, Bethlehem, Hebron, Jerusalem, Nablus, Qalqiliya, Tulkarm, Jenin,Tubas and Salfit. The Gaza Strip is a coastal zone at the eastern extreme of the Mediterranean Sea on the edge of the Sinai Desert. The Gaza Strip is surrounded by Israel to the east and north, Egypt to the south and the Mediterranean to the west. It is composed of five Governartes North Gaza, Gaza, Deir al Balah, Khan Yunis and Rafah.



Map 1.1: Palestinian West Bank and Gaza Strip in the Current Regional Context.

1.2 Topography

Despite its small geographical area, the OPT is characterized by a great variation in topography (Map 1.2). This variation is directly reflected on climate and the distribution and diversification of agricultural patterns, from irrigated agriculture in the Jordan Valley (the lowest area in the world) to rainfed farming in the mountains.



Map 1.2: West Bank and Gaza Strip Digital Terrain Map

The West Bank is divided into four major geomorphological parts: Nablus Mountains, Jerusalem Mountains, Hebron Mountains, and the Jordan Valley. The mountainous area of the West Bank serves as the main rainfall collection and replenishment zone for the underground water aquifers. Many drainage and valley systems are spread in and among the above mentioned four parts. The Gaza Strip is essentially a foreshore plain gradually sloping westwards. In the north of the Gaza Strip there are four ridges with different elevations ranging between 20 to 90 m above Sea Level. The ridges are: Coastal ridge, Gaza ridge, the el-Muntar ridge and the Beit Hanoun ridge. Active dunes can be found near the coast especially in the southern part between Deir el Balah and Rafah. Areas with large accumulation of loess can be found 15 km southwest of Gaza and east of Khan Yunis.

1.3 Geology

Mandate Palestine is located on the northwestern part of the Arabian Shield. During its geological history, this Shield separated from the great Afro-Arabian Shield along the Red-Sea line. A branch of this breakage extended along the line of Aqaba, Wadi Araba, the Dead Sea, and the Jordan Valley, and continued northwards to Lebanon, Syria and Turkey. The West Bank occupies the western part of this branch, known as the Jordan Rift Valley. The Arabian Shield consists of a complex of crystalline plutonic and metamorphic rocks (known as basement rocks). The western and northern parts of the Shield received large amounts of erosion products. During the geological times these sediments, known as shelf deposits, lay with unconformity over the basement rocks. Within the Shield deposits, two sedimentary bodies dominated; one is terrestrial and the other is marine. The terrestrial body is marked by inter-fingering of nitrite and lateral deposits. The marine body is mainly composed of carbonates. The West Bank is dominated by this marine body, particularly of carbonate deposits from the Mesozoic-Cenozoic eras.

During the Precambrian era, rocks of the Afro-Arabian Shield were subjected to folding. Consequently, high mountains (known as the Arab-Nubian Massif) surfaced in the southern part of the West Bank, as well as in the southern Sinai Peninsula, Saudi Arabia, Egypt, and Sudan. Towards the end of the Precambrian era, these mountains were eroded and flattend out. The erosion products were carried to the ancient sea called “Tethys”, presently known as the Mediterranean Sea.

Through out the Gaza Strip, the Quaternary deposits are underlain by the Saqiya Formation deposited during Pliocene-Miocene. This formation consists of shallow marine clays, shales and marls, reaching depth of about 1200 m at the shoreline and fanning out at the eastern boundary of the Strip. Well logs from deep oil exploration wells in the area show that below the Saqiya formation other Tertiary deposits (such as chalks, limestones, sandstones and marls) are found up to a depth of 2000 m. The quaternary deposits in the Gaza area are about 160 m in thickness.

Presently, the majority of the exposed rocks in the West Bank are marine sediments, particularly composed of carbonates (such as limestone, dolomite, and chalk). Litho-logically, the West Bank and the Gaza Strip consist of the following lithological units, arranged by age from older unit to youngest one (Geological Survey of Israel, 1983; ARIJ, 2002).

Pleistocene-Recent (alluvium)
Pleistocene-Recent (sand dunes)
Pleistocene-Recent (chalk, marl, conglomerate)
Miocene-Recent (basalt)
Miocene (metamorphic, rocks, mainly calcsilicates)
Pliocene (marl, limestone, sandstone, conglomerate)
Late Eocene-Miocene (marl, limestone, sandstone, conglomerate)
Eocene (chalk, limestone, chert)
Senonian (chalk, chert)

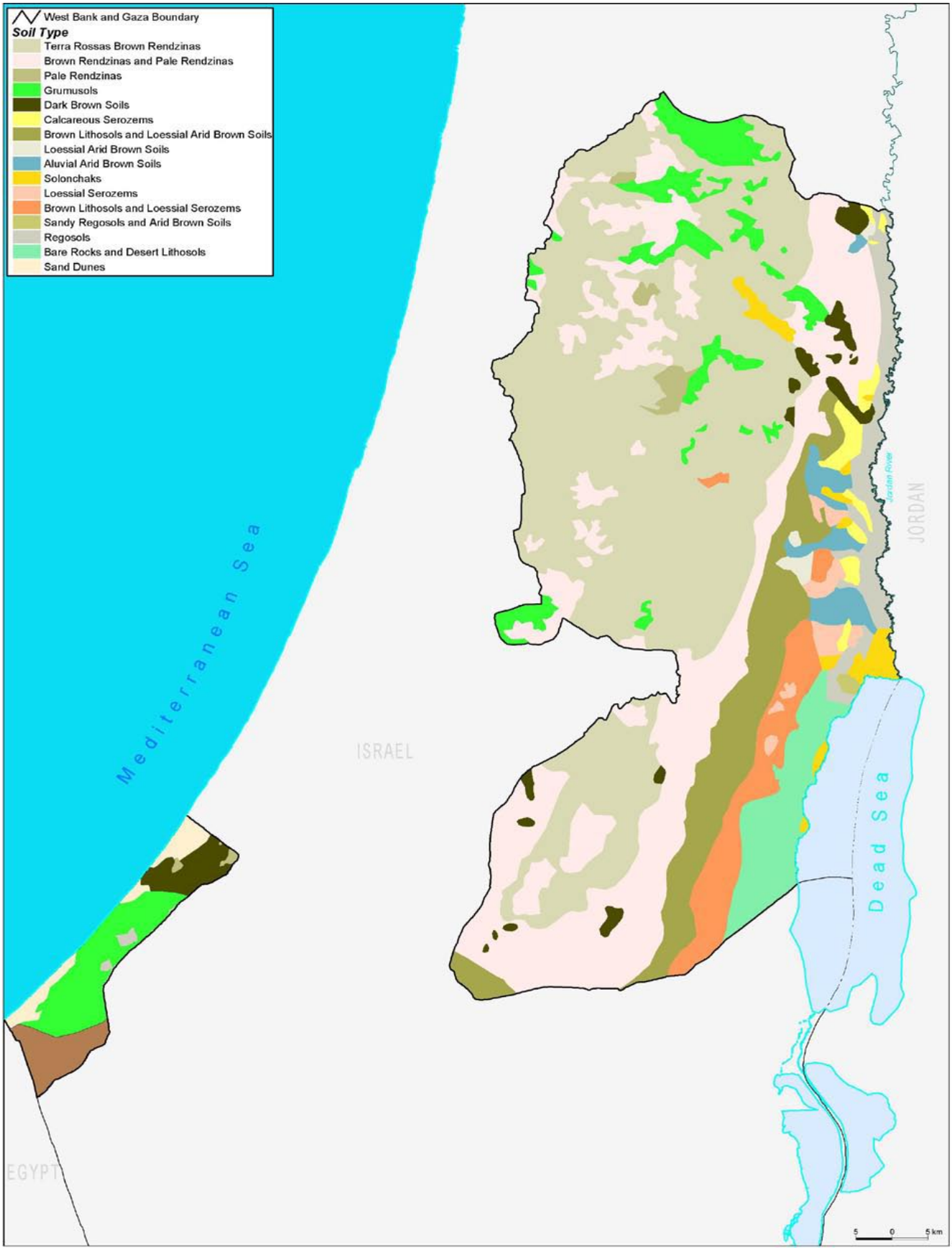
Cenomanian- Turonian (limestone, dolomite, marl)
Lower Cretaceous (basalt)
Lower Cretaceous (nubian, sandstone, dolomite, marl)
Jurassic (limestone, dolomite, sandstone, shale)

1.4 Soils

The soil resources of an area are one of the most important elements of the natural resources' base. Soils are the deposits of weathered, loosened, and transported particles, formed from so-called parent materials. Soils are the receptacle for all things buried and disposed of beneath and on the surface, as well as a physical, chemical, and biological filter for all natural phases that occur in the surrounding environment, including decomposition of organic materials and precipitation of rainfall. Soils are a natural finite resource, which is extensively used as a substance that cleans waters and recycles generated wastes, besides its support for agriculture, wildlife and the man-made environment (Miller and Donahue, 1990).

Soils, like other agro-biodiversity components in the OPT are distinguished for the high range of variety in type and nature. Soils in the OPT are formed due to several conditions including climate, physical weathering from wind and water, and other topographic materials, geology, and vegetation. Map 1.3 shows the soil distribution in the West Bank and the Gaza Strip. (Ravikovitch, 1969; ARIJ, 2005).

Climate and geology have a major influence on the formation of soils. Climate has two major factors for soil formation. The first is the temperature and the second is rainfall. As the two factors increase, the weathering of rocks and minerals will be faster. For every 10^0C rise in temperature, the rate of biochemical reactions doubles (MYU, 2005). Thus, the weathering process of soil is witnessed to be the highest in the eastern parts of the West Bank, followed by the eastern-southern parts of Mandate Palestine, and decreases to the minimum in the middle parts of the West Bank (Governorates of Rammallah, Bethlehem, Hebron, and partially of Nablus). As important as temperature is the factor of rainfall. The cool-wet areas hosts more considerable percolated rainfall amounts than the hot-wet areas, where water may evaporates back to the atmosphere before leaching can occur. With an arid to hyper-arid area along the eastern parts, and semiarid to sub-humid area along the western parts of the West Bank (all the way from the north to the south), there are a great variety of different soils.



Map 1.3: Soil types in the OPT

1.4.1 Characteristics of major soil types

The most common soil associations in the OPT are Terra Rossa and Brown Rendzinas, dominating in the central highlands of the West Bank. Brown Rendzinas and Pale Rendzinas are found to the north and south of the mountain ridge, in the Tubas, Qalqilyia and Hebron Governorates, and also in the Eastern Slopes region.

In the Gaza Strip, the most common soil type is Grumosols, which dominates the semi-arid loess plain area. Grumosols are also found in the far north and far west of the West Bank, coinciding with low-lying areas that enjoy a more temperate climate than other parts of the highlands. Table 1.1 shows the dominant soil types in each governorate in the OPT.

Table 1.1: Dominant Soil Associations in the Palestinian Governorates

West Bank

	Jenin	Tubas	Tulkarm	Qalqiliya	Salifit	Nablus	Ramallah	Jericho	Bethlehem	Hebron
Terra Rossa and Brown Rendzinas	X		X		X	X	X			
Brown Rendzinas and Pale Rendzinas		X		X						X
Regosols								X		
Bare Rocks and Desert Lithosols									X	

Gaza Strip

	Rafah	khan Yunis	Deir Al Balah	Gaza	Jabaliya
Sandy Regosols	X				
Grumusols		X	X	X	
Dark Brown Soils					X

1.4.2 Soil degradation

Soils are degraded as a result of many factors, including erosion, acidification and salinization. Two categories of soil deterioration process are recognized in the OPT. These are displacement of soil material (e.g., soil erosion by water and wind), and *in-situ* soil deterioration, covering chemical and physical soil degradation. Incorrect agricultural management, such as scarcity of water, uncontrolled domestic and industrial dumping sites, and the heavy usage of fertilizers are the main *in-situ* soil deterioration causes in the West Bank area. The Israeli Occupation exacerbates soil degradation, by confiscating and closing large swathes of land. This increases pressure on the land that Palestinians retain access to, encouraging overgrazing and intensive farming practices, besides creating a difficult environment, in which to plan and execute sustainable land management schemes.

Causes of soil degradation in the OPT can be further divided into anthropogenic (man-made) and non-anthropogenic (natural) causes. The natural causes include climatic changes (rainfall and temperature), where the man-made causes embrace socio-economic factors and existing land uses, However, the paramount risks that threaten the soil quality in the OPT can be described as follows:

- Soil Erosion: In most cases, this process affects the surface layers of the soil, which are rich with organic materials. This process is the cause of natural and non-natural factors. The natural factors

are the response of climatic change phenomenon, namely air and water transport of soil particles. However, the non-natural factors (human-made) are more tangible in the OPT. On one hand, the Israeli violations on the Palestinian soils are of a direct cause. These violations are presented in the construction of the Israeli settlements, bypass roads, military bases and segregation zones, as well as the Israeli destruction of the Palestinian environment, including the use of explosion materials. On the other hand, the misuse of arable lands by the Palestinians in the form of the destruction of the natural land cover that stabilizes the soil cover.

- Desertification: The Palestinian lands suffer from the desertification consequences which are a problem affecting the whole region. The results of this phenomenon are the decrease in the biological production and fertility of arable lands.

- Dry or Rain-fed Farming: This type of farming depends on the annual average of rainfalls, and it is spread in moisture and semi-dry regions of the West Bank and the Gaza Strip. The farming operations in these cultivated lands, located in the dry and semi-dry regions, result in the destabilization of the soil cover. This, in turn, causes the deterioration of the soil particles, leading to the decrease in the fertility rates of arable lands. This occurs where the affected particles lose much of their ability to absorb the rainfalls, leaving them susceptible to percolate to the underneath soil layers. Furthermore, the cultivation of lands in dry periods makes the surface soils more susceptible to air erosion.

- Ecosystem Degradation: The unsustainable use of humans to natural resources and the loss of balance between the major elements of the surrounding environment (plants, animals, soils, etc…..), causes the decrease in quality of soils and consequently the decrease in production of the arable lands.

1.5 Natural resources

1.5.1 Minerals in the Dead Sea

The Dead Sea is the lowest point on Earth, at about 430 m below Sea Level. It is also the deepest hyper-saline lake. It is a unique environment for wildlife, as it contains habitats that support hundreds of plant species. The Dead Sea contains about 21 mineral salts, among which some are not found in any other sea or ocean. These include sodium, magnesium, calcium, bromine, bitumen and potassium. However, compared with ordinary sea water, the Dead Sea contains 20 times more potassium, 32 times more magnesium and 81 times more bromine. This makes bromide ion concentration in the Dead Sea the highest of all waters on Earth. Table 1.2 shows estimated amounts for some of the Dead Sea minerals.

Table 1.2: Estimated amounts of Dead Sea minerals 1982/1996

Year	Potassium Chloride (million tones)	Sodium Chloride (million tones)	Magnesium Chloride (million tones)	Area (km^2)	Level (meter below Sea Level)	Magnesium Bromide (million tones)
1982	2,000	12	23,000	927.00	407.00	1,000
1996	1,800	11	21,400	870.81	413.16	800

Note: Estimates are calculated by Sea Level drop/area, and may be underestimated. Minerals are probably still present in the sediments.

Salt concentration of the Dead Sea is approximately 31.5%, which makes it ten times higher than other seas. The high salinity of the Dead-Sea water prevents the existence of life in the Dead Sea. Due to the composition of its water, the Dead Sea has become something of a health center. Many companies exploit the Dead Sea for cosmetic use. For example, several types of brines and black muds are used in the cosmetics industry to prepare a wide variety of products. Daily use of the Dead-Sea brines and black muds is evident in several health resorts along the western shore of the Dead Sea.

It should be noted that the Dead-Sea minerals are considered as shared resources by Israel, Jordan, and the OPT. However, while Israel and Jordan reap the benefits of the Dead-Sea minerals, Israel as an occupying power prohibits the OPT from doing so. And hence, the restrictions imposed on the Dead Sea area by Israel have denied Palestinians the opportunity to utilize such valuable and essential resource for the development of a Palestinian state.

The main industries in the Dead-Sea basin are found along the shores of the salting lakes. The Israeli industries are located on the western shores of the salting lakes, while the Jordanian industries, mainly the Arab Potash Company (APC), are located on the eastern shores. Each year, Israel pumps more than 300 MCM of brine into evaporation ponds at Sodom, along the southwest coast of the Dead Sea. On the Jordanian side of the Dead Sea, the APC produces 2 million tons of potash annually, as well as sodium chloride and bromine. Israeli and Jordanian companies use extensive salt evaporation pans that have essentially diked the entire southern end of the Dead Sea for the purpose of producing carnalite, potassium and magnesium chlorides. Accordingly, the southern basin of the Dead Sea (evaporation ponds) has expanded significantly in recent years, due to the potash industry and tourism on the Israeli and Jordanian sides (Table 1.3).

Table 1.3: Changes in the surface area of the Dead Sea and evaporation ponds

Year	Surface Area of Dead Sea (km^2)	Surface Area Evaporation Ponds (km^2)		
		Israel	Jordan	Total Area of Evaporation Ponds (km^2)
1947	1,031	0	0	0
1973	925	26	0	26
1985	676	139	105	244
1991	655	139	101	240
2000	640	144	116	260
2004	634	152	103	255

Source Dead-Sea Project, 2004

The Dead Sea and its unique environment are changing, due to the significant decline of the water level. For example, the water table in the surrounding area is dropping, causing a drying of the Dead Sea's micro-ecosystem. This has badly affected the surrounding environment, including unique wetland flora and fauna. Moreover, the drop in the water table and the ground water over-exploitation has led to the formation of sinkholes and land subsidence along the shorelines of the Dead Sea.

1.5.2 Stone quarrying

The West Bank's sources of stone include 222-255 quarries (USM, 2006). The vast majority of these quarries are concentrated in the Hebron and Bethlehem areas. Stone and marble factories, workshops, and quarries in the OPT are, however, distributed all over the West Bank and the Gaza Strip.

Stone production in the OPT constitutes around 4% of the world total, making the OPT the 12th largest stone producer in the world (Palestinian Marble and Stone Industry, 2005). Palestinian stone characteristics differ but most Palestinian stone types meet international standards and safety specifications. The West Bank has a rich stock of good quality stone, both soft stone and hard stone (marble), and represents the largest natural resource stock available to the Palestinian economy (USM Catalogue, 2004). This sector contributes approximately 25% to the Palestinian industrial revenue, which forms 4.5% to the total Palestinian GNP, and 5.5% of the Gross Domestic Product (GDP). The total annual revenue of this industry is estimated to be 450 million $, 65% of which comes from exports to Israel and about 6% comes from direct export to international markets (Palestinian Marble and Stone Industry, 2005).

In 1997, the Applied Research Institute-Jerusalem (ARIJ) reported 7 Israeli quarries in the OPT. These quarries, occupying an area of 1,673.3 hectares (4,183 acres), are built on land that Israel confiscated

after the signing of the Oslo I Agreement of 1993 (ARIJ, 1997). Most of these quarries have operated for a number of years, (of the seven quarries, there are only 4 in operation today). These quarries represent a systematic pirating of Palestinians' natural resources, as well as destruction of their land. The quarries are violations of international law, specifically the Fourth Geneva Convention. As an Occupying Power, Israel is prohibited, by international law, to expropriate and utilize the natural resources of the OPT, unless the use of these resources is for the sole benefit of the Occupied Population (the Palestinian people).

From an environmental point of view mining essentially is a destructive developmental activity. Due to the nature of mining, the impacts on environment are generally large. Mining operations involve deforestation, damage to or destruction of the natural vegetation, physical features and cause significant disturbance to wildlife. Leakage from the disturbed stone cutting facilities into groundwater could be a potential source of surface and groundwater contamination. And if, the used water runs into the soil, it could affect the soil stability and cause soil erosion. Other considerations include noise and dust impacts. Large amounts of particulate materials and dust are produced from quarries and stone cutting facilities as many of them located near residential areas. Particulate materials are harmful to human health, especially the respiratory system.

1.5.3 Other natural mineral deposits

Rocks are generally composed of mixtures of minerals, identified by the properties of their crystal structure, lustre, colour, cleavage, and fracture. The following mineral deposits are available in the OPT.

- Sulphur: Native sulphur is found in the north of Fasayil- Jericho Governorate.
- Iron: Small quantities of low grade iron-ore deposits (47% Fe) are found in the east of Kherbit Yarza - Tubas Governorate
- Bentonite: Bentonite deposits are mainly located to the east of Bethlehem.
- Dolomite: Dolomite is found to the west of Jab'a –Behtlehem.
- Cement raw materials: Raw materials for cement manufacturing (clay and limestone), are available in different locations of the West Bank, i.e. Yata (Hebron area).
- Phosphate: Apatite ore is found on the west shore of the Dead Sea.
- Baryte: It is a common mineral in association with lead ores. It also occurs as nodules in limestones, found in southern Bethlehem district.

1.5.4 Sand

The Gaza Strip is a flat to gently sloping land with sand and dune covered its coastal plains. The Gaza Strip's costal sand dunes are an important natural resource, and have a very high value, in terms of environmental protection, stabilization and habitat provision. These dunes traditionally protect the coastal areas from the sea. In addition, the sand dunes have a natural water cleaning capacity, and they are a unique habitat for flora and fauna, representing certain natural landscape values.

During the last decade, the intensity of various activities in the coastal area of the Gaza Strip has enormously increased. It has been estimated that the total amount of sand excavated in the last 20 years is more than 25 MCM, from an area of about 5200 dunums (5.2 km^2) (EQA, 2001). Of this, only 12% was extracted under license, whereas the majority is removed without permission. From an environmental point of view, this area is under anthropogenic pressure. Sand mining is a destructive activity, and the extensive release of large quantities of sand, without necessary planning or regulation, has caused serious problems in the Gaza Strip's natural landscape. The extensive sand mining practices in the Gaza Strip not only shorten the time period of this non-renewable resource availability, but also decrease the environmental protection function of the coastal sand dunes, the natural water purification

capacity of the sub-soil, and the habitat function for the flora and fauna.

Sand mining has been practiced by both Palestinian and Israeli contractors. The Israeli sand mining was practiced as a response to Occupation Strategy of exploiting Palestinian natural resources, including soils and sands. Absence of Palestinian control over the Palestinian land, in the past years, has facilitated Israeli mining activities. During the Occupation, Israel has been unjustly exploiting the natural resources by expropriating 10-15 truckloads of sand per day, on average 300-450 truckloads of sand per month. It was reported that in the period of 2002-2003, the Israeli Occupation Authorities used some 2,555 truckloads of sand from near Natsarim settlement, and the volume of these truckloads was estimated to be tens of thousands of cubic meters of pure, yellow, beach sand (Table 1.4).

Table 1.4: Amount of used sand from the Gaza Strip's shore in 1994

Region	Area (1000 m^2)	Amount (1000 m^3)
Beit Lahia	1,762	12,634
Gaza	1,005	3,645
Middle Area	1,240	3,765
Khan Yunus	660	2,652
Rafah	395	1,330
Mauasi	150	975
Total	5,212	25,001

Source: Palestinian National Information Center

1.5.5 Organic deposits

Natural gas

Two natural gas fields were discovered along the Gaza Strip coast. The first field (Gaza Marine) is located in Gaza territorial waters under Palestinian control. The second is 67% under Palestinian control and 33% under Israeli control. Two wells were drilled in the first field (Marine), which are located 35 km far from the Gaza shore, at depths varying from 530 to 680 m. Both contain about 85 million m^3 of gas. This gas is characterized of high quality, high calorific value (55.26 MJ/kg), relative density (0.56), and lack of sulfur (Palestinian Energy and Natural Resources Authority, 2006).

In 1999, British Gas (BG) signed a contract with the Palestinian National Authority (PNA) to develop the gas reserve. BG group has a 20-year contract on the natural gas reserves, with a partnership of 30% to the Consolidated Contractors Company (CCC) and 10% to the PNA.

When the Gazan gas fields are going to be developed, environmental concerns and precautions should be taken into account. There are numerous potential sources of environmental impact; from construction of drilling rigs to shipping and transportation of the extracted gas. Currently the BG group is considering exporting Gazan natural gas to Egypt for processing. If this turns out to be the case, then there will have to be liaison with Egyptian port and environmental authorities. The use of pre-existing Egyptian processing facilities means that there will be no need to construct processing and storage plants within the Gaza Strip, thereby reducing the potential for local environmental problems. Natural gas reserves could provide the needed source of revenue to the economically beleaguered PNA. Some analysts have estimated that once the gas starts flowing from the off shore Gaza reserves, it could earn about 50 million $ in tax revenue for the PNA.

Israel has refused to purchase gas from Gaza, preferring to construct an 80-mile sub-sea pipeline from El Arish - Egypt to Ashkelon-Israel, in order to supply annually 1.7 billion m^3 of Egyptian natural gas, as

part of a US $ 2.5 billion contract (Dittrick, 2005). However, the BBC news reported on May 2007 that the UK energy firm BG Group has confirmed it is in talks to agree a contract to supply Palestinian gas to Israel. Under the proposals, BG would transport gas from the Gaza Marine field through an undersea pipeline to the Israeli port of Ashkelon.

Oil shale in Nabi Musa (located 8 km southwest of Jericho city) is a general term applied to a group of fine black to dark brown shales, rich enough in organic material to yield petroleum upon distillation. Wadi Musa's oil shale consists of naturally bituminous marls of varying shades of brown, grey or black with typical bluish light-grey color when weathered. The organic material of oil shale contains largely bituminous ground-mass. Nabi Musa is a large energy resource in its vast geological reserve of oil shale, containing about 200 million tons of oil shale reserves. This location has shales of high organic matter content (17%), 1240 calorific value (Kcal/kg), and about 8% oil content (PAMA, 2000).

1.6 Threats to natural resources

A wide variety of factors puts stress on the availability and integrity of the natural resources in the OPT. Perhaps the greatest threat to the Palestinian natural heritage is unsustainable use of natural resources; namely poorly planned development, land management challenges, and pollution. It is also important to mention the threats from the Israeli Occupation, which often create a situation where Palestinians cannot benefit from their natural resources, whereas Israel moves to exploit the resources in an unsustainable manner; and inflicts damage on the Palestinian environment. The Israeli impact needs to be monitored, assessed, and taken into account in the design of development plans and management of the natural resources (Figure 1.1). Population growth, technological change, and urbanization are all responsible for rapidly rising resource consumption. As the population, technology and lifestyle demands grow exponentially, people use increasing amounts of many natural resources. This often results in adverse impacts, both to the land and on its living and non-living resources.

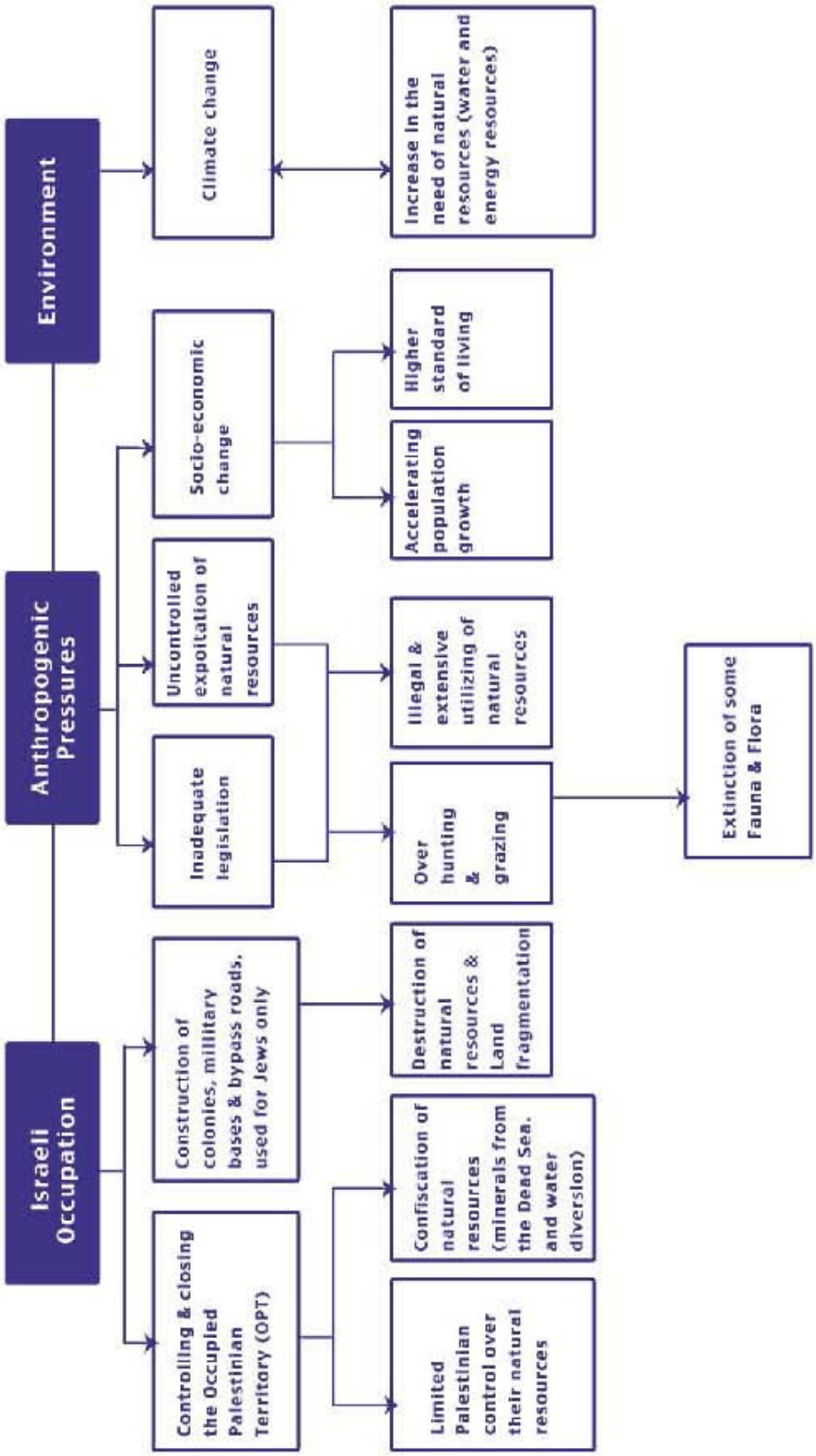


Figure 1.1: Factors threatening and increasing pressures on natural resources in the OPT

1.7 Climate

The geographical location of the (OPT) is between 31°13' and 32°33' Latitude, and between 34°13' and 35°34' Longitude. This location makes the area highly influenced by the Mediterranean climate. The Gaza Strip, inparticular, is part of the Mediterranean coast. The Mediterranean climate is characterized by a long, hot, dry summer and short, cool, rainy winter. Rainfall is limited to the winter and spring months. The rainy season usually starts in the middle of October and continues up to the end of April. Snow and hail, although uncommon, occur in areas of the West Bank, with the greatest frequency falling in the west of, and over, the highlands (Rofe & Raffety, 1965).

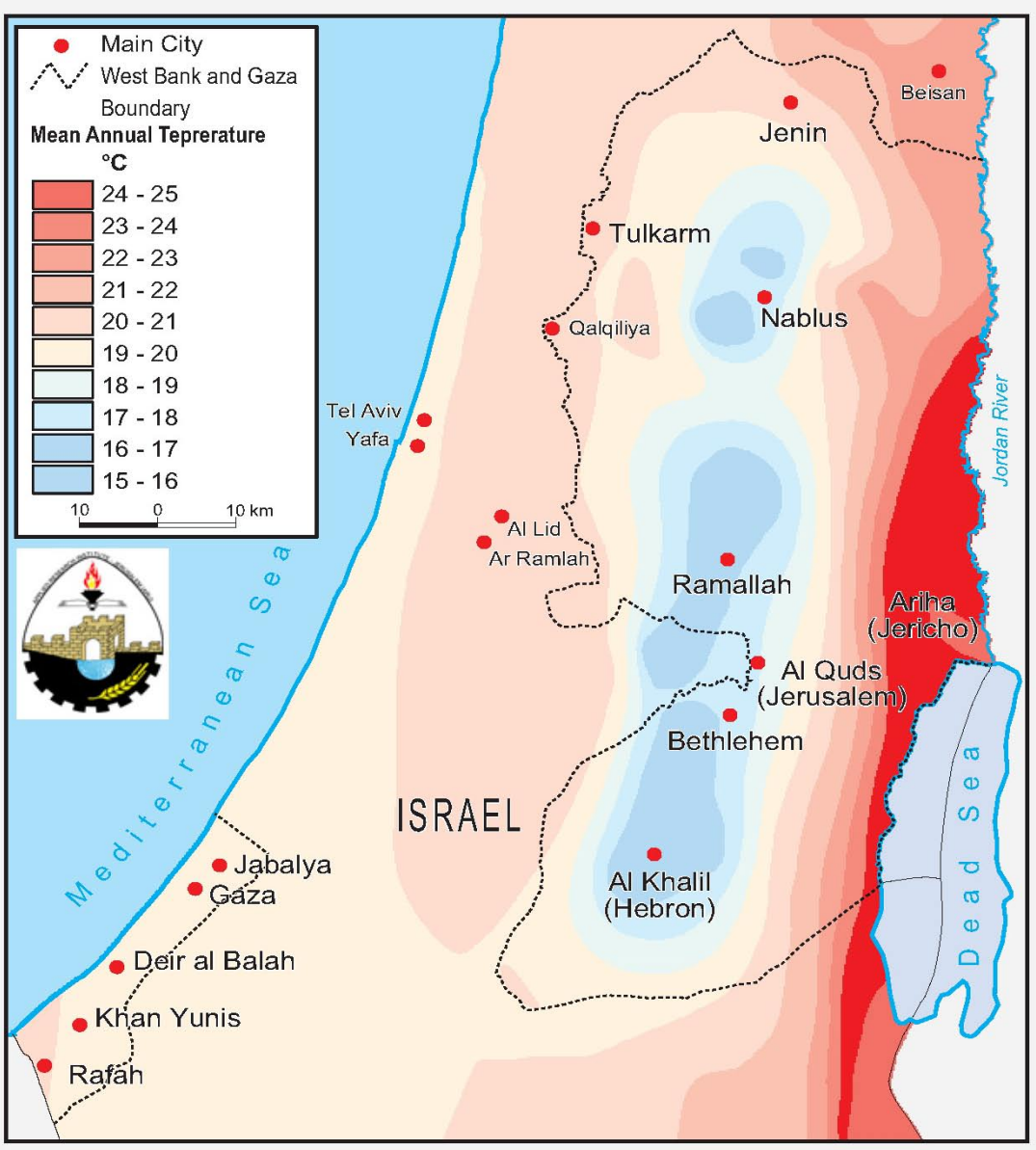
Climate within the relatively small area of the West Bank is affected by diverse ranges in topography and altitude. Accordingly, the West Bank is divided into four main climatic regions, including the Jordan Valley, the Eastern Slopes, the Central Highlands, and the Western Slopes.

The mountainous areas in the West Bank, which stretch from north to south, serve as a barrier to the passage of moist air coming from the western direction. The western air is always wet as it is coming from the Mediterranean Sea. The marine influence passes deep into the Tulkarm and Jenin Governorates. It also reaches the western edges of the Nablus, Ramallah, Jerusalem, Bethlehem and Hebron Governorates. It does not pass deep into these Governorates, due to the presence of highlands that counter the wind. In the southern area of the West Bank, the marine influence decreases as the Mediterranean shore bends to the southwest, thus increasing the distance between the sea and the West Bank. In the northern part of West Bank, there are no hills to block the sea winds. Therefore, the marine influence passes easily across the open lands of the Marj Ben Amer Plain and reaches to the Jordan Valley. This explains the increased quantity of rain in the northern part of Jordan Valley, despite the fact that most of it is below Sea Level. The southern part of Jordan Valley has a different transitional climate, varying between dry steppe and the extreme desert conditions of the Dead-Sea region.

The climate of the West Bank, especially in the south, is influenced by the vast nearby Negev and Arabian deserts. Especially during the spring and early summer, desert storms move through with hot winds full of sand and dust (known as "Khamaseen"). These storms increase the temperature and decrease the humidity.

1.7.1 Temperature

Temperature varies according to the geographical position, altitude, and exposure to marine influences, etc (Map 1.4). In the OPT, temperature is relatively high. The highest temperature is in the Jericho Governorate in the Jordan Valley. Temperature of the Jordan Valley increases from north to south, contrary to altitude. The highest temperatures are registered at the Dead-Sea region, at the deepest point (375 m below Sea Level) (ARIJ, 1997). The Dead Sea is situated in the lowest altitude area in the world and surrounded by a series of high mountains from both east and west, creating a natural greenhouse climate. The northern mountains around Nablus register the lowest average temperature of the northern part of the West Bank, while the average temperature in Tulkarm, which has a lower altitude, is the highest in the northern region of the West Bank and the second highest temperature in all regions of the OPT (Figure 1.2).



Map 1.4: Mean Annual Temperature (Celsius) in the OPT

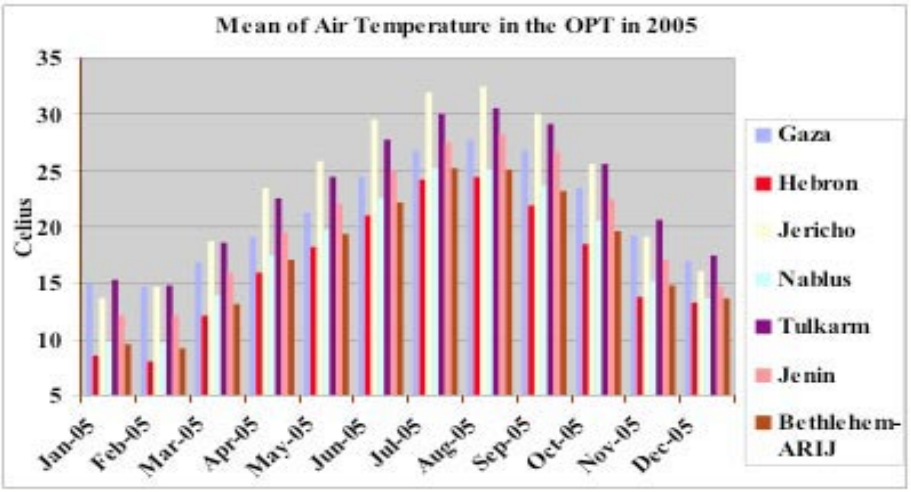


Figure 1.2: Monthly Mean of Air Temperature (Celsius) in the OPT in 2005
Sources: Meteorology Office-Ministry of Transport–Palestinian National Authority; Applied Research Institute-Jerusalem (ARIJ).

1.7.2 Sunshine Duration

The OPT has a sunny climate. Inhabitants of the OPT depend on this renewable source of energy for heating of water. Solar radiation, reaching the area of the OPT, varies from one place to another. The longest hours of sunlight occur in June or July and the shortest from December to February (Figure 1.3).

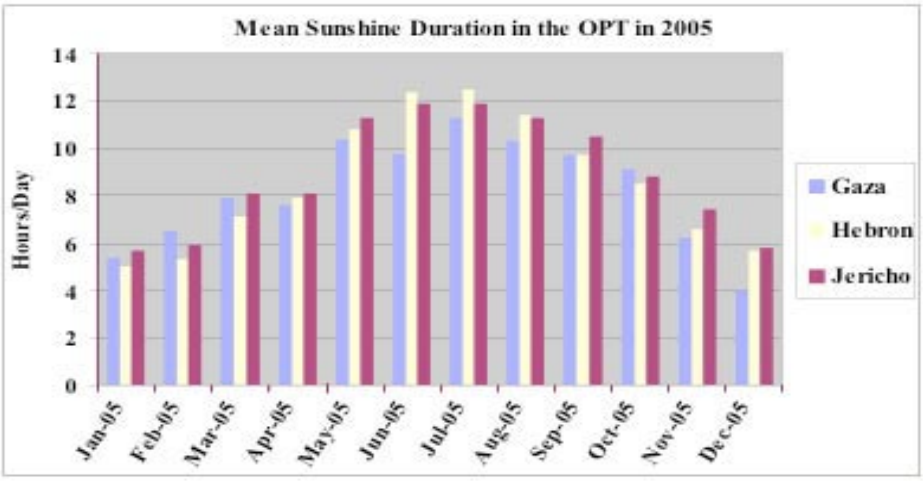


Figure 1.3: Mean of Sunshine Duration (Hours/Day) in the OPT in 2005
Source: Meteorology Office-Ministry of Transport-Palestinian National Authority.

In the summer, solar radiation is strengthened by almost completely clear skies. In the winter, a reduction in solar radiation occurs due to cloud cover. The solar radiation reaches its lowest value in December, when the sun is over the Tropic of Capricorn (Southern Tropic) and the days are short. Table 1.5 shows the variations of the mean monthly solar radiation in the West Bank.

Table 1.5: Variations of mean monthly of solar radiation (MJ/m²/day) in the West Bank for the period 1968 – 1992

Month	Jerusalem	Hebron	Bethlehem[1]	Jericho	Nablus	Tulkarm[2]	Jenin[2]
Jan	10.2	9.6	10.2	9.7	9.5	9.9	10.1
Feb	14.1	11.6	14.1	12.2	11.4	12.3	12.4
Mar	17.4	16.2	17.4	18	16.1	16.2	16.5
Apr	22.5	20.7	22.6	21.5	20.8	20.1	20.3
May	26.7	23.2	26.7	24.7	23.1	23.2	24.3
Jun.	28.5	22.5	28.5	27.2	22.6	25.5	26.9
Jul.	27.8	24.2	27.8	27.4	24.2	24.3	26.4
Aug	26.3	25.1	26.3	25.8	25	22.1	23.7
Sep.	21.7	21.9	21.7	21.7	21.8	19.2	20.4
Oct.	15.2	18.3	15.2	17.1	18.2	15.5	16.2
Nov.	10.3	12.4	10.3	12.4	12.3	11.9	12
Dec.	10	9	10.1	9.2	9	9.4	9.6

Source: Israeli Meteorological Service, 1994.
1 Sunshine hours recorded for 1994-1995, at ARIJ Electronic Meteorological Station.
2 Sunshine hours recorded from data compiled by FAO-Agrometeorological group for 42 years.

1.7.3 Relative Humidity

The relative humidity has an influence on people and on all living organisms, especially the very low humidity experienced during the Khamaseen. Hot winds may cause damage to the skin of people and animals. Agricultural crops are also affected, especially when the dry wind blows during the flowering period; the first stage of fruiting. The Gaza Strip (which is part of the Mediterranean coast) has the highest annual mean relative humidity, increasing from winter to summer. On the other hand, Jericho (in the Jordan Valley) has the minimum relative humidity, decreasing from winter to summer. Jenin also has high relative humidity, because of its location close to the Mediterranean Sea, and due to the lack of topographic barriers. For data on relative humidity (Table 1.6).

Table 1.6: Mean of Relative Humidity (%) in the OPT in 2005

	Gaza	Hebron	Jericho	Nablus	Tulkarm	Jenin	ARIJ-Bethlehem
January	59	69	70	67	64	70	66
February	63	71	66	61	71	75	70
March	64	62	55	57	63	67	60
April	64	51	42	50	52	61	51
May	69	55	43	54	58	58	55
June	71	55	44	60	58	65	57
July	73	52	43	59	60	65	52
August	70	59	47	65	60	64	61
September	64	63	47	61	57	63	62
October	61	61	48	57	53	61	60
November	61	65	59	60	59	65	64
December	66	57	66	61	69	67	58
Average	65	60	53	59	60	65	60

Source: Meteorology Office-Ministry of Transport-Palestinian National Authority; Applied Research Institute-Jerusalem (ARIJ).

1.7.4 Precipitation

The rainy season starts in October and continues to the end of April. In the northern West Bank, it tends to start a little earlier and last a little longer, with frequent exceptions. Almost 70% of the annual rainfall occurs between November and February. January is the highest rainfall month in the year in most stations in the OPT (Figure 1.4).

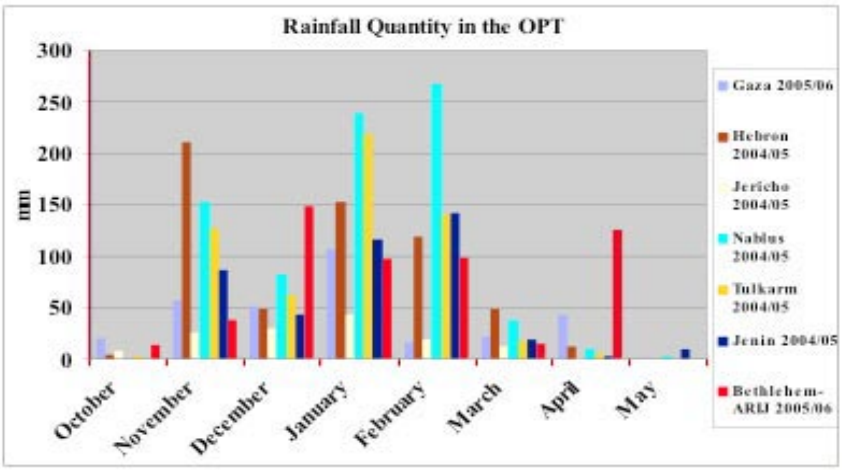


Figure 1.4: Rainfall Quantity (mm) in the OPT in 2004/05 and 2005/06
Source: Meteorology Office-Ministry of Transport-Palestinian National Authority; Applied Research Institute-Jerusalem (ARIJ).

In the winter, depressions, passing from west to east over the Mediterranean, bring westerly rain-bearing winds. The rising ground of mountains of the West Bank acts to force the moist air upwards, causing it to shed its moisture on the ridge. The areas in the rain shadow and on slopes, facing east and southeast, receive lower quantities of rainfall. This is because, as the air flows downhill, it warm sand rainfall ceases. However, if there is a break in the mountain ridge, the marine influence can move further interior. This is the case in the northern part of the Jordan Valley, where the lack of mountains allows the Mediterranean winds to flow across the Marj Ben Amer Plain and into the Jordan Valley, where rain is precipitated. This part of the Jordan Valley receives more rainfall than other parts, despite its low altitude.

Precipitation decreases from north to south. The northern part of the West Bank is closer to the usual track of storms, coming from the northwest. The pressure gradients cause the air masses to rise at steep angles, cool, and gain in relative humidity. The larger vapor content reaches the saturation point earlier and increases the chance of precipitation (Map 1.5).

Map 1.5: Average Annual Rainfall (mm) in the OPT

1.7.5 Evaporation

Evaporation is particularly high in the summer, due to the rise in temperature, intensive sunshine, and low humidity. Towards the coastal plain, the rate of evaporation decreases, because of the year around exposure to the humid sea breeze. Evaporation rate is relatively low during the winter months when the solar radiation is lowest (Figure 1.5). Only water surfaces, which are in contact with the air, are fully affected by evaporation. Water that has seeped into the ground is, for the most part, protected. Rainfall is concentrated in the winter season, when evaporation is at its lowest. The highest evaporation rates in the OPT occur in the summer months in the Jordan Valley. Evaporation from the Dead Sea is particularly high (averaging 2600 mm annually), due to intense solar radiation and low relative humidity. Evaporation in the Gaza Strip is the lowest anywhere in the OPT, due to high relative humidity, lack of surface water and less intense solar radiation and fewer hours of sunlight.

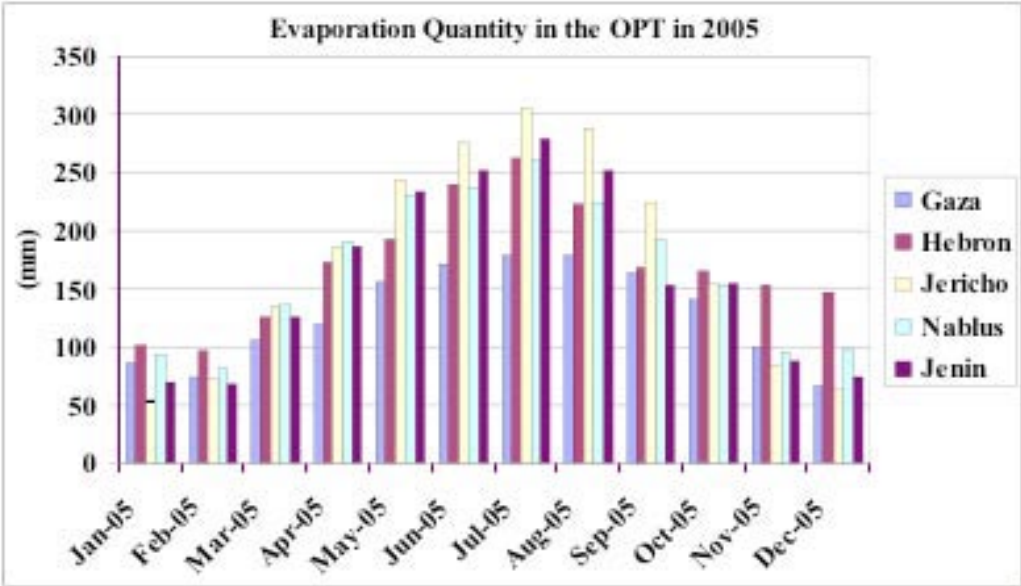


Figure 1.5: Total Evaporation Quantity (mm) in the OPT for each month of the year 2005
Source: Meteorology Office-Ministry of Transport-Palestinian National Authority

1.8 Outlook

The management of natural resources in the OPT is particularly critical. The limited natural resources, destructive policies of the Occupying Power (Israel), and Palestinian needs to the resources impose a challenge to those working in this field. On the ground, Israel has and is still continuing its unilateral moves and actions in the OPT, which are designed to undermine Palestinian future planning and development. This means that conservation, management and protection of natural resources must be the context of restricted ability and a constantly changing and tentative political situation. This is, by itself, a formidable task for Palestinian decision-makers and planners, as they act to bring about laws, regulations and systems under constantly changing conditions, as natural resources continue to be under negotiation.

Palestinian sovereignty over their natural resources is imperative to the development of a sound and sustainable policy. Therefore, it is recommended that the recuperation of the Palestinians' full rights over all of their natural resources should constitute by far the most important strategic option. Moreover, the PNA must accelerate its efforts to ensure the sustainable management and conservation of the very limited natural resources, and to maintain their quality for the use of future generations of the Palestinian people.

In summary:

1) The Natural resources in the OPT are being exploited by the following activities:
   - Overexploited of Sand in Gaza Strip for building purposes
   - Palestinians and Israelis in the West Bank continue to carry out rock quarrying heavily
   -The Israelis have been extracting the minerals of the Dead Sea, extensively. Whereas Palestinians cannot benefit from these natural resources, due to restrictions imposed by Israel

2) Soils of the West Bank are exposed to many sources of pollution that deteriorate their quality. These sources include irrigation with salty water, extensive use of pesticides and fertilizers, uncontrolled dumping of industrial and domestic solid waste and wastewater. In addition, the lack of water for irrigation leads to an increase in soil salinity. These sources have detrimental effects on the soil properties, since they contain high concentrations of heavy metals, nitrates, phosphorus and salts, which accumulate in the exposed soils.

Therefore, there is a major need to:

- Formulating policy and plans related to sound natural resources management based on political scenarios;
- Conduction environmental auditing for the polluting industries including Quarries
- Building modern GIS (Geographic Information System) and DSS (Decision Support System) for natural resource management;
- Conducting comprehensive soil surveys and continuously monitoring soil erosion;
- Assessing the extent of soil degradation and identifying hot spots, where mitigation measures need to be taken;
- Initiating pilot projects for reducing soil erosion and for maintaining soil fertility;
- Preserving existing natural resources;
- Enhancing the protection, sustainable management and conservation of all natural recourses;
- Rehabilitating degraded nature areas;
- Encouraging investments in land reclamation projects
- Rehabilitating poor soil and steep rocky lands; and
- Promoting awareness about natural resource values.

Chapter Two

Land Use and Geo-Political Profile

2.1 Introduction

Almost six decades have passed since the endorsement, by almost every country in the world, of the Fourth Geneva Convention. This admirable document represents extensive research and detailed analysis of experiences of all relevant wars that predate the outset of the Convention. As such, articles of the Convention have proven invaluable in the "**Protection of Civilians in Time of War**." In the Israeli – Palestinian conflict, the latter have always regarded the articles of the Convention as being of great importance in their right of pursuance of an independent, autonomous state. One particular Geneva Convention's Article is crucial to the Palestinian fight for recognition: Article 49 (section III, Occupied Territories) states:

> *The Occupying Power shall not deport or transfer parts of its own civilian population into the territory it occupies.*
> ***-- Article 49, Geneva Convention relative to the Protection of Civilian Persons in Time of War, (12 August 1949).***

The relevance of this particular Article did not present itself until 1967, when Israel occupied the West Bank including East Jerusalem (5661 km^2), the Gaza Strip (362 km^2) and the Syrian Golan Heights and the Egyptian Sinai peninsula. Consecutive Israeli governments (Labor & Likud) relentlessly pursued implementation of a settlement program in the Occupied Territories, in order to consolidate Israeli State's control and consequently, to prevent the possible emergence of a Palestinian State.

The consecutive Israeli governments played the settlements card the same way it did in the era that predated the 1967-war and the 1948-war, which is to establish sovereignty, security and define territorial limits. However, it is concluded that the Israeli settlements were intended to define territorial expansions of the Israeli State and, more importantly, to validate and legitimize the Israeli Military's existence in the Occupied Areas; allegedly to protect the existence of Israeli settlers, otherwise, the Israeli Army would be just an occupation army of land and population.

Following the 1967-war, the settlements' program became a major and permanent issue on the agenda of consecutive Israeli governments. Even though the Israeli settlements are a distinct violation of international law, the Israeli leadership under either Labor or Likud attempted to legitimize their existence, by giving them "temporary" classification under the pretext of security purposes.

The construction of the Israeli settlements also has a pattern, which has become more obvious over time; to sever Palestinian localities from each other and to restrict locality expansion by controlling as much empty and populated land as possible. Appropriation of water resources and vast open space areas are also a major facet of the Israeli Occupation.

To realize these objectives, consecutive Israeli governments illegally implanted hundreds of settlements throughout the West Bank (including East Jerusalem) and the Gaza Strip. While the Israeli Labor party focused on building settlements around Occupied Jerusalem, the Latroun area, the Jordan Valley and Gush Etzion, the Likud party had a policy based on reinforcing settlements within Occupied Jerusalem as well as deep inside the West Bank.

The year 1968 witnessed the launch of the Israeli-State's settlements program in the Territories occupied during the 1967-war. Although these civilian settlements were and are considered an explicit breach of international law, they still received unlimited support from consecutive Israeli governments as well as financial support from other non-governmental politically inclined groups. All contributed to ratifying and financing building of illegal settlements on illegally confiscated private and public Palestinian land.

To that end, Israel has applied different approaches to control the Palestinians' land; as a result of confiscations and declaration of closed military areas, Israel controls 57% of the West Bank and 17% of the Gaza Strip (though Israel's announcement of withdrawal from the Gaza Strip in September 2005). Appropriation methods practiced by Israel include:

* Land confiscation, allegedly for security
* Areas proclaimed as "State Lands"
* Declaring substantial areas as nature reserves and subsequently restricting access
* Declaring substantial areas as military areas and restricting access
* Confiscating large areas to build networks of bypass roads to serve Israeli settlements

Consequently, Israeli political institutions built hundreds of illegal Israeli settlements in the West Bank and Gaza Strip, which became homes to hundreds of thousands of Israeli civilians. By September 2005, there were 21 Israeli settlements in the Gaza Strip housing an estimated 8,000 settlers, and some 207 settlements in the West Bank (including East Jerusalem) with a population exceeding 450,000 Israeli settlers; almost half of whom reside in East Jerusalem. Furthermore, Israel has constructed a 795 km network of bypass roads that have reshaped the physical and geographical structure of the Occupied Palestinian Territory (OPT).

When the Israeli Army established control and authority over territories seized in the course of armed conflict during the 1967 war; the very act of entry of Israeli armed forces to territories that were not part of Israel's sovereign territory or under its administration for that matter; gained the Israeli Army a "belligerent occupant" status under international law.

According to international law, *"the Occupied Palestinian Territories that come under the control of a belligerent occupier do not, in any way, become sovereign territory of the occupying state."*

Thus, an occupying state's control is classified as interim restricted rule over the territories it occupied and their inhabitants. All resources available are under the Occupier's jurisdiction provided they are used **only** for military security, to protect the rights and interests of the inhabitants, to reserve the sovereignty and status quo of the occupied territories and **not to set an orderly government rule of any kind.**

Based on the aforementioned, the Israeli settlements in the OPT are in contradiction to the limits which apply to Israel as a belligerent occupier, as the Israeli settlements do not meet the interim category but appear to be of long duration intent; correlated with an orderly governments rule, not of security significance to the Israeli military or state.

Consequently, the Israeli settlements constituted a cornerstone of the Israeli policy in the OPT; they impeded the unfavorable choice for Israel to withdraw from the OPT in compliance with UN resolution 242: 1(i) of 1967: ***"Withdrawal of Israeli armed forces from territories occupied in the recent conflict."*** Furthermore, settlements with all their related activities (outposts, bypass roads, buffer zones, etc) also worked to eliminate the prospect of territorial contiguity sufficient to establish a Palestinian sovereign state; an issue which has often caused the collapse of permanent border negotiations between Israel and the Palestinian Liberation Organization (PLO) as many Palestinian areas (cities, towns and villages) were wrapped up and cut off by Israeli settlements and bypass roads. The consecutive Israeli governments spared no expense to push the settlements program forward, particularly in the West Bank with concentration on occupied East Jerusalem and allocated for that purpose billions of US dollars over decades to build, develop, and expand the magnitude of settlements in the OPT.

In 1977, 57,000 Israeli settlers lived in the OPT, 50 thousands of which in East Jerusalem alone. By 1993, the number of Israeli settlers in the West Bank and Gaza Strip reached 100,000 settlers, and 140,000 Israeli settlers in Occupied East Jerusalem respectively; these figure almost doubled again by 2005.

2.2 The Peace Process and the Fate of Settlements

In 1993, the PLO signed the Oslo Accords with the State of Israel, accepting just 22% of Mandate (Historical) Palestine (the West Bank (including East Jerusalem) and the Gaza Strip), as the basis for a Palestinian State, with Jerusalem as its Capital.

The "Oslo II" Interim agreement, signed in Washington D.C. in September of 1995, sets out the interim stage for Palestinian Autonomy in the West Bank and Gaza Strip, pending "final status negotiations" which were scheduled to begin in May 1996 and end by May 1999. Hence, the OPT was divided into Areas "A," "B," and "C," which designate varying levels of control (Table 2.1)

Table 2.1: Areas definition in Oslo II Interim Agreement, September 1995

Area A	*The Israeli army has pulled out fully and Palestinians hold all responsibilities for internal security and Public order.*
Area B	*Palestinians have full control over the civil administration and Israel continues to have overriding responsibility for security.*
Area C	*The Palestinians have responsibility for civil life such as economics, health and education; however, Israel retains full control over security and administration related to territory.*

The Interim Agreement states that the first phase of the Israeli military forces redeployment will be completed prior to the eve of the Palestinian Legislative Council (PLC) elections in 1996 where area "A" makes 3% (169.5 km^2) of the West Bank, area "B" 24% (1359 km^2) and area "C" 73% (4132.5 km^2). Further redeployments were to be completed within 18 months from the date of the inauguration of the PLC, during which control, responsibilities relating to territory were set to transfer gradually to PNA jurisdiction to cover the West Bank, and the Gaza Strip, except for the issues that will be negotiated the permanent status negotiations (i.e. Jerusalem and settlements). For the Palestinians, this meant that 95% of the West Bank and the Gaza Strip (excluding Jerusalem and the Israeli settlements' area, which constitute almost 5% of the OPT) would fall under Palestinian control roughly by July 1998.

However, with the constant Israeli put offs to their commitments to the signed agreements and delay of negotiations and demands to renegotiate what was already agreed upon caused a partial and limited Israeli withdrawals to what was agreed upon, so by March 2000, area "A" comprised 1,004 km^2 (17.7%) of the West Bank and a further 254.2 km^2 (70.2%) of the Gaza Strip while area "B" comprised 1,204 km^2 (21.3%) of the West Bank, while area "C" constituted 3453 km^2 (61%) of the West Bank and 107.8 km^2 (29.8%) of the Gaza Strip.

The jagged distribution of areas "A", "B", "C", has scattered the OPT into isolated cantons, which are physically separated from each other and from the Gaza Strip, which was agreed to have a safe passage with the West Bank but the Israelis did not allow it to function as agreed at any time.

The issue of Israeli settlements existing in violation of international laws and United Nations Security Council resolutions; along with the issues of borders, water, Jerusalem and the refugees' Right of Return were deferred to final status negotiations, conditional upon both sides preserving the "Integrity and Status" of the West Bank and Gaza Strip during the interim period. However, construction of new Israeli settlements and expanding of existing ones have continued until now, ignoring Oslo agreement this is in addition to the boundary manipulation by Israel with the ongoing construction of the Segregation

Wall. In 1992; prior to the signing of the Oslo Accords, the number of Israeli settlers in the West Bank (including East Jerusalem) and the Gaza Strip were just about 250,000. Since then, Israel encouraged the increase of the settlers' population, which mounted to more than 450,000 by September 2005.

Even though Israel adopted a unilateral withdrawal plan from Gaza Strip settlements, it did so as the presence of Israeli settlers there became a failed project and a drain of money and human resources, and due to the continued resistance to the Israeli Occupation by Gazans. This was not the case in West Bank's settlements, which characterize a consummation between ambition for territorial gains and plans to dissect geographical contiguity of the West Bank, in order to eliminate Palestinian aspirations for a geographically contiguous autonomous State of their own.

2.2.1 Settlements, Oslo, and Peace

The Oslo Accords of 1993 and 1995 called for the preservation of the "Integrity and Status" of the OPT (including East Jerusalem) until final status' talks could be held in 1996. However, Israel continued with its settlements' expansion and building program and in fact, it has doubled the number of Israeli settlers since then. This makes the prospect of a viable, contiguous Palestinians State an unrealizable concept, nullifies the essence of the entire peace process, and entrenches the presence of the Israeli army in the OPT.

The ICJ believes that the wall is an attempt to connect settlements and settlers to Israel, creating 'facts on the ground' and *de-facto* annexing Palestinian land, which will have a significant impact on future negotiations regarding borders. Israel is also bound to the Hague Convention of 1907, which it violates by confiscating land to construct the wall on.

International Court of Justice ruling, July 9, 2004

2.2.2 Increase of Israeli Settlements' Area between 1990 and 2005

Since the signing of the Declaration of Principles (Oslo Accords) in 1993, Israel has intensified its policy of creating facts on the ground to affect the outcome of the final status negotiations. Israel has accelerated settlement activities, by confiscating further Palestinian land to establish new settlements on hilltops and expand existing settlements. In addition to constructing, a comprehensive network of by pass roads (for Jew, only) represents further land confiscation. These activities have been a major source of instability for peace negotiations between the Government of Israel and the Palestinians.

According to Israeli data, there are 149 settlements in the West Bank. However, Israeli figures do not include any settlements' related activities in occupied East Jerusalem, including the Israeli settlers' population. Analysis of satellite images conducted by the Geographic Information Systems Center at the Applied Research Institute-Jerusalem (ARIJ) identified 282 Israeli built-up areas in the West Bank including East Jerusalem. This excludes military complexes, closed military areas, and bypass roads.

It should be indicated at this point that the Israeli settlements built-up areas occupy 3.3% (188 km^2) of the West Bank land area. Master plans for these settlements, however, occupy a much larger area, amounting to 485 km^2 (8%) of the West Bank (Table 2.2).

Table 2.2: Israeli land use in the Occupied West Bank

Item	Area (in km^2)	Percentage (of total area of the West Bank)
Settlements Master Plan	485	8%
Israeli Military Base	49	1%

Table 2.2 Continued

Closed Military Area including parts declared nature reserve areas	999(714+285)	18%
Bypass Roads	112	2%
*Israeli Proclaimed Nature Reserve Areas	417	12%
Total of Occupied West Bank Area	**2336**	**41%**

* total area of which, 702 km^2

Israel at no time ceased its colonial activities in the West Bank; but maintained a steady pace of expanding settlement areas and building new housing units, violating in the process numerous laws and agreements; from the United Nations Security Council resolutions and the Fourth Geneva Convention of 1949 to the Palestinian-Israeli Oslo "Peace" Accords signed in 1993 & 1995.

Between 1990 and 2005, the built-up areas of the Israeli settlements increased by nearly 173%, where total settlements' area accounted for 188 km^2 (3.3%) of the West Bank land territory by the end of 2005. The Israeli consecutive governments have maintained steady expandable policy for the Israeli settlements for the settlements, which even intensified following the signing of the Declaration of Principles in 1993. However, Israel had totally disregarded the preceding and continued to build and expand settlements and for that end, it confiscated Palestinians' land, demolished their houses, and uprooted thousands of trees.

The following table (2.3) lists the changes of the built-up areas in Israeli settlements in the West Bank between 1990 and 2005. Table (2.4) shows a list of selected settlements to indicate the magnitude of increase of the built-up areas during the same period.

Table 2.3: Growth of Israeli settlements built-up areas in the West Bank between 1990 and 2005

Year	1990	1996	1997	1999	2000	2004	2005
Settlements' Built-up Area (km²)	69	93	109	148	151	184	188
Percent of the West Bank Area (%)	1.2	1.6	1.9	2.6	2.7	3.2	3.3

Table 2.4: Israeli settlements with large increases of its built-up area between 1990 and 2005

Settlement Name	District	Establishment Date	1990 Dunums	2005 Dunums	(%) Percentage Increase
Betar Illit	**Bethlehem**	**1989**	**430**	**4712**	**995**
Efrat	**Bethlehem**	**1979**	**663**	**2190**	**231**
El David (Kfar Eldad)	**Bethlehem**	**1975**	**22**	**217**	**900**
Tekoa	**Bethlehem**	**1977**	**282**	**1071**	**279**
Bet Ain (Tsoref)	**Hebron**	**1989**	**137**	**666**	**385**
Hagai	**Hebron**	**1984**	**184**	**990**	**439**
Maale Havar (Pene Hever)	**Hebron**	**1983**	**128**	**598**	**365**
Maon	**Hebron**	**1980**	**70**	**597**	**748**
Hinnanit	**Jenin**	**1980**	**118**	**769**	**554**
Rehan	**Jenin**	**1977**	**84**	**418**	**399**
Shaked	**Jenin**	**1981**	**58**	**860**	**1379**
Tal Memashe	**Jenin**	**1994**	**12**	**278**	**2156**
Adam (Geva Benyamin)	**Jerusalem**	**1983**	**119**	**1195**	**904**
Givat Zeev	**Jerusalem**	**1977**	**1033**	**2856**	**177**
Givon	**Jerusalem**	**1978**	**18**	**118**	**566**
Har Adar	**Jerusalem**	**1985**	**417**	**1193**	**186**
Kokhav Yaacov	**Jerusalem**	**1984**	**193**	**2287**	**1088**
Maale Adumim	**Jerusalem**	**1975**	**3457**	**6205**	**80**
Mishr Adumim (Industrial Zone)	**Jerusalem**	**1974**	**768**	**3378**	**340**
Mizpe Yedude	**Jerusalem**	**1980**	**74**	**271**	**269**
Neve Brat	**Jerusalem**	**1992**	**150**	**871**	**481**
Pisgat Amir	**Jerusalem**	**1985**	**836**	**2516**	**201**
Rekhes Shuafat	**Jerusalem**	**1990**	**73**	**1625**	**2133**

Table 2.4 Continued

Eli	Nablus	1984	298	3195	972
Elon Moreh	Nablus	1980	414	1396	237
Gittit	Nablus	1972	128	1058	728
Homesh	Nablus	1980	349	1050	201
Noomi	Nablus	1979	638	4942	675
Itamar	Nablus	1984	322	2993	830
Mekhora	Nablus	1973	183	925	406
Alfei Menashe	Tulkarem	1981	1048	2905	177
Kedumim Zefon	Tulkarem	1982	64	318	400
Zufin	Tulkarem	1990	162	621	283
Beit Arye	Ramallah	1982	379	1420	275
Makkabim	Ramallah	1982	689	1941	182
Mevo Horon	Ramallah	1969	409	1341	228
Modin Illit (Qiryat Sefer)	Ramallah	1991	470	4015	755
Naaleh	Ramallah	1982	159	884	455
Ofra	Ramallah	1975	747	2275	204
Pesagot	Ramallah	1981	153	587	282
Beqaot	Tubas	1972	780	2353	202
Mehola	Tubas	1969	389	1759	352
Shadmot Mehola	Tubas	1978	308	1259	308
Avnei Hefetz	Tulkarm	1987	97	1210	1144
Enav	Tulkarm	1981	154	729	373
Hermesh	Tulkarm	1983	55	463	737

2.2.3 The Outposts Phenomenon

In 1998, Jewish settlers started to take control of hilltops and establish camps on sites. Later on, these sites came to known as Israeli settlements' outposts. Since then an outburst of the outposts' phenomena spread through out the West Bank, where the Israeli settlers contrive to take control of hilltops in the OPT mainly within 1-4 kilometers from existing settlements.

The consecutive Israeli Governments; did not endorse the outposts phenomena; and did not provide financial support for them; rendering them to be illegal and unauthorized, it still simultaneously and indirectly provided them with infrastructural support through the Israeli Army, which also provided them with security blanket to carryout their attacks against Palestinian lands. The role and partnership of the Israeli Governments in the outposts phenomena, was best articulated in 1998 in the words of the Israeli Agriculture Minister at that time and former Prime Minister Ariel Sharon; when he encouraged the settlers to raid and take control of Palestinian grounds before "losing them to Palestinians in negotiations."

> ***«Everybody has to move, run and grab as many hilltops as they can to enlarge the settlements because everything we take now will stay ours ...everything we don't grab will go to them.»***
> ***Ariel Sharon addressing a meeting of militants from the extreme rightwing Tsomet party, Agence France Presse, November 15, 1998***

The number of outposts kept growing to a record high in the year 2005 as 217 outposts' locations were identified. The following table (2.5) lists number of outposts established between 1996 and 2005.

Table 2.5: Number of Outposts (1996-2005)

Year Interval	Number of Outposts
1998-2001	41
2001-2003	60
2003-2004	74
2004-2005	42
Total	217

Source: ARIJ Database-2007

The outpost maybe classified into two categories, the first of which falls within an existing settlements'' master plan and later on is turned into a new neighborhood for that settlement. The ones that stand-alone are identified as new settlements sites to be developed later. In a satellite image analysis, 77 outposts' locations were included within existing settlements master plans area, while the remaining 140 were established in new locations. The analysis also showed that 56 of the outpost existed within the Western Segregation Zone and 28 outposts in the Eastern Segregation Zone and 68 of them within the corridors linking the Western and Eastern zones together. As for the remaining 65 outposts, they were randomly scattered throughout the West Bank.

2.2.4 Israeli Bypass Roads

Along with launching a vigorous settlements program following the Israeli Occupation of the West Bank and the Gaza Strip, back in 1967, the consecutive governments of the state of Israel adopted a separation concept based on the creation of an Israeli controlled road grid system, which will work to facilitate the construction of Israeli settlements and the Israeli settlers movement between the OPT settlements and Israel and eventually incorporate the Israeli created and controlled road grid system in the OPT with the road grid system in Israel.

The Israelis built these roads under the pretext of "security needs"; a term that presented the Israeli Army with legitimate excuse to expropriate Palestinian lands; a procedure that proved its efficiency before when the Israeli Army would expropriate Palestinian lands under the "security needs" pretext to establish an Army base, which later on is turned to Israeli settlers control who would turn it on their part into a civilian inhabitant area. For Israel, that was the only available option or the only loop to bypass the international law, which considers, expropriating land for any purpose other than military use a "grave breach". Israel also argued the military role of the settlements and the bypass roads to its security, which allowed the Army to expropriate private Palestinian lands to build settlements and its roads; Israel also argued that the roads it is building will also benefit the local Palestinian population who would be allowed to travel on these roads. Furthermore, the Israeli built roads on confiscated Palestinian lands contributed immensely to stimulate the habitation of the Israeli settlements, which encouraged the Israeli settlers to take initiative and construct roads on their own, but would later on be endorsed and adopted by the Israeli Army to cast a shadow of legitimacy on these roads. In addition to its role in connecting settlements, the Israeli built roads worked to restrain the development of the Palestinian communities in the West Bank by creating de-facto obstructions to areas designated for development.

The term "Bypass Roads" did not come into use until the signing of Oslo agreement between the Israelis and Palestinians in 1993 to indicate designated roads for the Israeli Army and settlers use, to bypass Palestinian towns and communities in the context of the Israeli Army redeployment. From that point on, Israel intensified its efforts to increase the magnitude of the bypass roads in the OPT as a part of its policy to coerce facts on the ground; ultimately affecting the outcome of negotiation with the Palestinians; including the establishment of a viable contiguous Palestinian State. The Oslo Accord classified the West Bank into three jurisdictions: Area "A"; where the Palestinians have full control over the land; security and administrative wise, and Area "B"; where Palestinians have only an administrative control, while security is for the Israeli, and Area "C"; where Palestinians has complete control and the Palestinians has none. The majority of the West Bank area is Area "C", which hold all Israeli settlements and consequently the Israeli bypass roads that pierce at many classified "A" and "B" areas establishing a physical obstruction between two controlled Palestinian areas.

Photo 2.1: A section of the Israeli Segregation Wall west of Bethlehem along the Israeli Bypass road # 60

Prior to the outbreak of the September 2000 Intifada, Palestinians had almost complete access to these bypass roads, except at time when the Israeli Army is on security alerts that Palestinians are no longer allowed to travel on the bypass roads or would have to undergo a through security check conducted by the Israeli Army border patrols. However, following the 2000 Intifada, Palestinians accesses to virtually all bypass roads became forbidden; unless they are in possession of a special permit issued by the Israeli civil administration. Later on, the Israeli Army would refer to bypass roads were Palestinian are no longer allowed to travel on as "sterile" roads; meaning that these are Palestinians free roads.

Today, almost 800 km (109 km^2) falls under the bypass roads category and it occupy's 109 km^2 of the west Bank area. The constructed bypass road system complies in synchronization with the Israeli settlements' program; as it facilitate movement of these settlements toward each other and with Israel, beyond the Green Line. The Israeli Army denies the Palestinians access to most of the bypass roads.

2.3 The Israeli Segregation Zone in the Occupied West Bank

A shift in the Israeli settlement program accrued in the year 2002, as emphasis on settlements expansion was not a priority in comparison to previous years. This shift is mainly attributed to political development in the nature of the conflict as the Israeli government started talking about demarcation of the Israeli State border to separate the Israeli State from the foreseen Palestinian ruling entity. However, the features of the settlement program remained the same; in fact, it started to consolidate years work into the final chapter of the settlement program; the western Segregation Zone, which wraps up the major settlements blocs with most of the Israeli settler's population along the West Bank western border; engulf in the process nearly 10% (555 km^2) of the West Bank area, in addition to 29% (1664 km^2) along the eastern West Bank border that will remain under Israeli control.

The wall results in the violation of human rights including the right to freedom of movement, access to holy places, to work, to health, to education, and to an adequate standard of living. The ICJ decision upholds the right to self-determination of the Palestinian people, which they are prevented from exercising by the wall's disruption of the territorial integrity and unity of the population. 'Self-defense' or 'state of necessity' can not be used as justification for violating this right and other international legal principles and therefore Israel must cease construction and all other states must refrain from supporting Israel in building the Wall.

2.3.1 An Overview

In June 2002, the Israeli government launched its policy of unilateral segregation between Israel and the OPT by establishing Segregation Zone along the western terrains of the Occupied West Bank.

The Israeli Segregation Zone covers substantial sizeable and significant land areas, rich with natural resources (including groundwater aquifers) as it runs along through the western part of the West Bank from north to south grabbing the most fertile agricultural lands, isolating Palestinian communities in enclaves, undermining the territorial contiguity between the Palestinian villages and cities, controlling the natural resources and encapsulating most of the Israeli settlements.

At this time, an explanation of the term "Segregation Wall" should be made obvious as it reflects two shapes of structure used by the Israeli Army to complete their territorial separation mission in the OPT, it is either concrete partitions 8-12 m in height or in the other case "the fence" is used, but in both cases the term Segregation Wall applies. Based on the characteristic nature of the area where the Segregation Wall runs, the type of the structure is determined. For example, in areas where the Segregation Wall cuts through vast agriculture lands, it is a fence. The fence is in fact more devastating as it takes an area of a 40-100 m in width to complete, as it consists of double layered fences reinforced with barbed wire, trenches, military roads and footprint detection tracks, as well as 4-5 m high electrified metal fences with security surveillance cameras. In the other case, in areas with sizeable population and/or in-close perimeter with the 1949 Armistice Line (the Green Line), the Segregation Wall consists of 8-12 m high concrete partitions appendage with military watchtowers lined-up 250 m apart.

In parallel, Israel has de facto created an Eastern Segregation Zone without walls or fences but through control of access points along the Jordan Valley and the shores of the Dead Sea. **This zone has a total area of 1664 km^2, representing 29.4% of the West Bank and includes 43 Israeli settlements and 42 Palestinian localities.**

In September 2004, the Israeli Occupation Army issued military orders to establish a buffer zone averaging 150-200 meters on the Palestinian side of the Segregation Zone where the Army denied the Palestinians to carryout any constructions or to utilize the land in anyway without prior authorization from the Israeli civil administration. As a result, an additional 252 km^2 (4.4%) of the West Bank will become inaccessible to Palestinians.

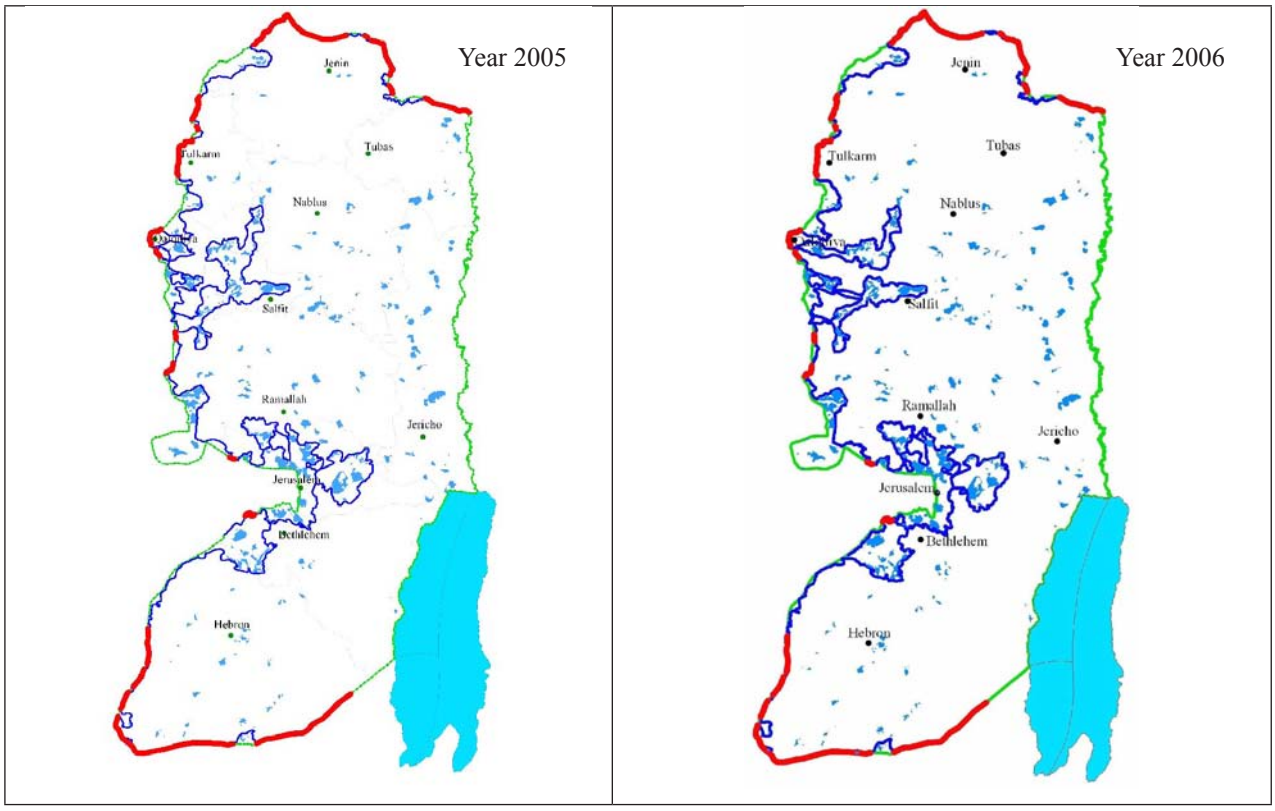
On February 20, 2005, the Israeli government published a revised route of the Western Segregation plan, where the Wall was set to run for 683 km in the West Bank. Only 138 km (20.2% of the total length) runs on the Green Line (the 1949 Armistice Line). When complete, 576 km^2 of Palestinian land (10% of the total West Bank area) was set for isolation from the rest of the West Bank. It also enclosed 98 Israeli settlements accommodating 83% of the Israeli settler's population in the West Bank and 55 Palestinian localities.

On April 30, 2006, the Israeli government published yet another revised route of the Western Segregation plan, where the Wall would extend along 703 km in the West Bank. The new revised plan will run the

Segregation Wall on 128 km (18.2% of the total length) of the Green Line (the 1949 Armistice Line). When complete, the Segregation Wall will isolate behind it 555 km² of Palestinian land (approximately 9.8% of the total West Bank area). It will continue to enclose 103 Israeli settlements accommodating 408,000 (85%) of the Israeli settlers' population in the West Bank; however, it increases the number of isolated Palestinian localities behind the Segregation Wall to 59. Since then, the Israeli Army issued additional military orders in relation to the Segregation Wall route, which effectively increased the length of the Segregation Wall by 3% (22 km) to become 725 km in total.

Table 2.6: Status of the Western Segregation Zone as of April 2006

Status of the Western Segregation Zone as of April 2006 including adjustments		% of Total Wall Length
Existing sections	450 km	62 %
Planned sections	173 km	24 %
Under Construction	102 km	14 %
Total length	**725 km**	**100%**



Map 2.1 Segregation Wall route adjustments between 2005 and 2006

2.4 Terminals in the West Bank

Terminals is just another Israeli employed tool to control and manipulate the lives of more than 2.4 million Palestinians living under the control of the racist Israeli Occupation, which restrict the movement of Palestinians to designated roads and through terminals controlled and operated by Israeli soldiers and their sadistic moods which has resulted in the death of more than 120 Palestinian over the last years of the current Intifada. The concept of terminals controlled by an Occupation Army amount to the level of Apartheid; in fact; it is an unambiguous case of Apartheid when the occupation Army confine movement of those under occupation to certain routes and through specific terminals.

In September 2005, Israel decided to establish 10 terminals and 23 crossing points throughout the Occupied West Bank, five of these terminals are under construction and are designed for commercial functions where cargos are moved "back to back" on these terminals Tarqumia (Hebron), Al-Jalameh (Jenin), Mazmuria (Bethlehem), Sha'ar Ephraim (Tulkarm) and Betunia in Ramallah. The other five terminals; Hasam Tzahub (Jordan Valley), Terminal Gilo 300 (Bethlehem), Shu'fat, Az-Ayyem and Qalandiya in Jerusalem; are already operating and they control the movement of Palestinian throughout the OPT. However, Israeli military orders issued after September 2005 revealed that there are 15 terminals throughout the West Bank; an additional five new terminals; Al-Jab`a, Al-Khadr and Al-Walaja in Bethlehem, Metar south of Hebron and Mechabim west of Ramallah. In 2006, three more terminals were added (Anata-Shufa't & Hizma in Jerusalem and Um Salamona south of Bethlehem).

Photo 2.2: An Israeli Terminal west of Beit Jala to Facilities Israeli Settlers' access to Jerusalem and Israel

Israel attempted on many occasions to justify its terminals project by underlining the questionable reality that the terminals are built to facilitate Palestinians' life and bring about contiguity within Palestinian districts. Moreover; Israel attempt to legitimize the terminals issue which stand in violation of the international law on the freedom of movement by asking the World Bank to subsidize the terminal project; but the latter refused the Israeli request since these terminals are not constructed on the internationally recognized Armistice Line of 1949 (the Green Line) and that they come to emphasize the construction of the controversial and illegal Segregation Wall in the Occupied West Bank.

According to the Universal Declaration of Human Rights *(1948) " All people are entitled to the recognition of inherent dignity and certain inalienable rights, which are the foundations of freedom and justice in the world. Freedom of movement is part of the liberty of man (Jagerskiold), thus making it one of the most basic human rights."* ***Article 13 of the Universal Declaration of Human Rights stipulates: Everyone has the right to freedom of movement and residence within the borders of each State.***

2.5 Checkpoints in the Occupied Palestinian Territory

Checkpoints have always been standard procedures of the Israeli Occupation Army since the 1967-Occupation of the West Bank and Gaza Strip. However, it was not until the Palestinian Intifada of September 2000 that the Israeli Army increased the number of operating checkpoints in the West Bank and the Gaza Strip to unprecedented levels next to restrictions imposed on the Palestinian populace attempting to cross these checkpoints. Furthermore, over the past few years, the behaviors of the Israeli soldiers stationed at these checkpoints has taken a turn beyond the usual hassle treatment to more acts that falls within manners of vicious and sadistic behaviors; as many Palestinians of different segments of the Palestinian society; students, teachers, patients, medical staff and employees were subjected to various forms of Israeli cruelty, which involved beating, humiliation (striping of cloths and sitting on a dirt mud), held for hours under the burning sun or the cold whether before they are allowed to cross a certain checkpoint.

Checkpoints have had an extremely detrimental effect on Palestinian society. The fallouts of the Israeli soldiers' acts at checkpoints had its tormenting affect on the Palestinian society; causing social ties cutoff, economic severance between districts, rise in the unemployment creating unprecedented levels of poverty and disruption to daily life activities and internal emigration. In addition to that, the abilities and efficiency of medical services became severely hindered as medical staff, doctors, ambulances and patients have been denied access through the checkpoints; including medical emergencies. On many occasions, patients have been transported over difficult terrain in wheel chairs or on animals (donkeys) as even ambulances were not allowed to cross, causing patients death in many cases. Moreover, the Israeli soldiers at checkpoints impose a time restriction on the movement at many checkpoints; and even though it is not clear that the Israeli Army authorizes such actions; it is all the same, since similar and much more brutal actions went on with impunity.

The Israeli checkpoints vary in its physical structures; cubical cement roadblocks, earth mounds, manned checkpoints and agricultural gates, tunnels, secondary roads iron gates. Today, there are 576 Israeli checkpoints dissecting and isolating the Palestinian localities from each other. The following table (2.7) lists the number and various types of obstructions established by the Israeli Army to restrict and confine the movement of 2.4 million Palestinian residents of the OPT:

Table 2.7: Number and type of Israeli checkpoints in the Palestinian governorates

District	Check points	Earth Mound	Observation Tower	Permanent Checkpoint	Road Gate	Road block	Tunnel	Agricultural Gate	Sum
Hebron	8	124	10	2	23	12	1	9	189
Jerusalem	14	13	0	0	8	4	2	3	44
Jericho	5	4	4	0	0	2	0	0	15
Bethlehem	6	15	6	2	3	2	7	4	45
Tulkarem	2	11	2	1	1	3	2	13	35
Tubas	6	1	0	0	5	0	0	4	16
Salfit	4	10	3		2	2	5	8	34
Ramallah	5	20	9	3	11	10	6	3	67
Qalqiliya	1	4	1	0	1	2	2	15	26
Jenin	7	1	6	0	3	0	0	10	27
Nablus	10	46	7	0	7	7	0	1	78
Total	68	249	48	8	64	44	25	70	576

ARIJ Database, 2007

The Israeli checkpoints in the OPT are turning into border points, a place where Israeli soldiers strip people of their dignity and compromise their humanity. The Israeli persistence to coerce facts on the ground under the pretext of security does not justify their collective punishment approach toward the

Palestinian people and their ongoing outrageous infringement of Palestinians' human rights.

> *"Moreover, as long as large areas of the West Bank remain inaccessible for economic purposes -- including the settlements and their municipal jurisdiction, the "seam zone", the Jordan Valley and other "closed areas", and unpredictable movement remains the norm for the vast majority of Palestinians, sustainable economic recovery will remain elusive. Economic recovery and sustainable growth will require a fundamental reassessment of closure practices, a restoration of the presumption of movement, and review of Israeli control of the population registry and other means of dictating the residency of Palestinians within West Bank and Gaza as embodied in the existing agreements between GOI and the PLO."*
>
> **World Bank Report, May 9, 2007**

Such Israeli oppressive policies against the Palestinian civil population not only that it violate international laws; but also cause a lot of frustration and despair among the Palestinian people, especially that these restrictions are imposed only on Palestinians, meanwhile, Israeli settlers existing illegally under international law in the Occupied West Bank; are free to move about at will; on the bypass roads built especially for them on confiscated Palestinian lands.

2.6 The Strangulation of the Gaza Strip

The Gaza Strip is once again facing a prolonged periods of closure, which is crippling the economy, and contributing to unbearable day-to-day living conditions. The fact is that the Gaza Strip has suffered from various levels of sustained closure since the end of the Israeli disengagement process in September 2005. These closures did not only restrict the freedom of movement of people but often also hinder the transportation of food and urgent medical supplies.

Over the past 18 month period (i.e., since the Israeli disengagement in September 2005), the economy and living conditions in the Gaza Strip have been steadily declining due to these prolonged closures. The result is that life in the Strip is indeed becoming unsustainable to the level where the former General Secretary of the UN had to make a formal request that Israel allow 'life' to be sustained.

When Israel announced its plan to 'disengage' from the Gaza Strip, the Palestinian government, and some members of the international community quickly became aware of the need to ensure that the people of the Gaza Strip had the required access to movement. In order to further the international credibility of the sovereignty myth, Israel eventually accepted that the Gaza Strip should have at least one access point to the outside world, where the Israeli Army has no direct control on.

The result was that an agreement to open the Rafah border crossing with Egypt was signed on 15 November 2005, some two months after the 'disengagement'. Had the Rafah border crossing came under full Palestinian control this would have gone part way towards giving the Gaza Strip some sovereignty as a political unit. However, the Israelis outright refused to agree to such arrangement, which led to the final agreement, that concluded a role for the European Union to oversee the functioning of the Rafah border crossing whilst the Israelis would have a 'surveillance' presence.

On June 27, 2006, the Israeli Army re-entered the Gaza Strip under the guise of trying to re-capture the Israeli prisoner of war. Since that time, the Israeli Army has conducted a campaign of infrastructural warfare, which has crippled the day to day functioning of the entire Strip. Within days of the beginning of the 'rescue operation' the military had destroyed seven key bridges, most of the main connecting roads, severely damaged the only power station in the Strip and opened fire on dozens of civilian buildings.

The recent complete closure of the Strip is being perversely justified as a security measure designed to ensure that a captured Israeli soldier (who is being held as a prisoner of war) is not removed from the Strip.

The obvious results of such large campaign against an infrastructure that maintains nearly 1.5 million people are quite devastating[1]. Food and medical supplies are running out very quickly, hospitals are having to depend upon emergency generators in order to keep functioning and the sewage and sanitation network is close to collapse this indeed a disastrous situation for the most densely populated location on earth. When the complete closure of the Strip is seen in this light – closure to supplies as well as movement - it becomes clear that the Israelis are deliberately trying to create a humanitarian disaster in the Gaza Strip.

Unfortunately, recent aggression has not come as a surprise to many Palestinians. In spite of the 'sovereign Gaza' myth that the Israelis have been cultivating in the international media since disengagement, the plan may be seen as nothing more than an elaborate strategic redeployment of troops. The Israeli military still have full control over the airspace of the Gaza Strip and use it regularly to assassinate Palestinian political activists on the ground. Inside the Strip, the Israeli Army control 'buffer zones' along all the borders which are 400-600 m (at some locations up to 1000 m) areas of land where all agricultural land has been raised and all houses destroyed. When this is combined with the fact that the Israeli navy control the coast and all the land borders have now been sealed, it becomes apparent how much of a fallacy an 'independent Gaza Strip' really is. *[See ARIJ report or 20/10/2004 "what does Sharon want of Gaza for disengagement analysis]*

This token symbol of sovereignty that was granted as part of the disengagement plan has been revealed for what it is: an illusion. The Israeli military can enter the strip at any time they deem appropriate, seal all the borders to the outside world (including invaluable 'life' supplies like food), devastate the infrastructure, and guarantee that the Gaza Strip never achieves anything even resembling independence. This prolonged closure of the Gaza Strip, combined with the massive military assault, has only served to demonstrate how the occupation of the Gaza Strip has not ended – it has evolved.

The recent closures of the Gaza Strip are part of a campaign of strangulation. The massive Israeli military incursion, the destruction of the infrastructure and the closure of all borders can be seen as nothing more than a deliberate attempt to foster a humanitarian crisis, which will make the Gaza Strip unlivable.

2.6.1 Situation of Gaza Strip's Border Crossings

Following the so-called Israeli disengagement from the Gaza Strip, back in September 2005, there was an agreement drawn in December 2005 between Israel and the Palestinian Authority on procedural operation on the seven Gaza border crossings:

1. Beit Hanoun (Erez) Crossing
2. Al-Shogaeih (Nahal Oz) Crossing
3. Al-Mentar (Karni) Commercial Crossing
4. Al-Qarara (Kesufiem) Crossing
5. Al-Awda (Sofa) Crossing
6. Karm Abu Salem (Kerem Shalom) Commercial Crossing
7. Rafah International Crossing Point

Since the beginning of the Israeli Army's incursion to the Gaza Strip in June 2006, Rafah terminal has been almost closed completely most of the time; trapping thousands of Palestinians on the Egyptian side and isolated the Strip from the outside world. Table 2.8 lists the operational status of selected terminal in the Gaza Strip, including Rafah terminal.

Table 2.8: Operation status of selected Gaza terminals between March 2006-March 2007

Month/Year	Rafah Crossing	Karnei Crossing	Sofa Crossing	Nahal Oz Crossing
March 2006	100%	52%	22%	NA
April 2006	100%	56%	80%	NA
May 2006	100%	96%	74%	NA
June 2006	77%	73%	54%	81%
July 2006	6%	58%	0%	77%
August 2006	16%	41%	30%	100%
September 2006	10%	96%	71%	88%
October 2006	23%	96%	87%	100%
November 2006	20%	92%	77%	88%
December 2006	32%	96%	92%	0.88%
January 2007	26%	100%	100%	100%
February 2007	25%	92%	96%	100%
March 2007	48%	96%	29%	96%

Source: OCHA

Unsurprisingly, Israel continue to manipulate the signed agreement under the pretext of security, which caused the border crossings to partially function most of the time, except for the Rafah commercial crossing, which was literally closed most of the time from the time the agreement was signed back in December 2005 to this day. The few exceptions that were made to let Palestinian trapped at the border to enter the Gaza Strip or leave it to Egypt was when humanitarian disaster was about to been declared at the border crossing. The rest of the Gaza Strip border crossings were operational on partial bases. The only exceptions were made for international diplomats. International workers, staff of international organizations, and international journalists require prior coordination with the Israeli Liaison Office at the crossing to move to and from the Gaza Strip.

Partial openings under humanitarian pressure were allowed to bring in essential foodstuffs, medical supplies, and other necessities into the Gaza Strip. The closure of the crossings and complete blockade led to a steep increase in the level of poverty and unemployment rates. Furthermore, the blockade violates civilians' right to freedom of movement and travel to and from the Strip. In addition, it has adversely affecting the flow of food and medical supplies and other necessities such as fuel, construction materials, and raw materials for various economic sectors. This blockade has had unprecedented catastrophic impact on the living conditions of the civilian population.

The Israeli Security Buffer Zone in the Gaza Strip

Back in September 2005, at the time when the Israeli Army have taken the Israeli settlers out of Gaza and strategically redeployed the Israeli Army troops around Gaza, within the Israeli controlled security buffer zone. In December 2005, just few months following the Israeli Army's redeployment in the Gaza Strip, the former Israeli Prime Minister Ariel Sharon ordered the Israeli Army to establish a no-go zone along Gaza's northern border, where Palestinians are not allowed to access without Israeli authorization. The zone also includes the location of three evacuated Israeli settlements Dugit, Nisanit and Eli Sinai. The Israeli Army secured a security buffer zone around Gaza's northern and eastern borders of 61 square kilometers, upon which, some 17% of Gaza remained under full Israeli Control.

On June 28, 2007, Israeli sources revealed that the Israeli Army would mark the security buffer zone to 1.5 km width on the Palestinian side along Gaza's northern and eastern border. The security zone starts of from the Mediterranean Sea shores northwest of Gaza to Rafah crossing border at the southeast of Gaza. An analysis conducted by the Geo-Informatics department at the Applied Research Institute-Jerusalem (ARIJ) concluded that the security would consume yet an additional 26 km² along the northern and eastern border of Gaza Strip.

The Timeline of the Israeli Security Buffer Zone

The security buffer zone along Gaza's northern and eastern border came as a part-clause of the 1994 Oslo Accord, under which, the Israelis were to maintain a 0.5 km wide security zone across the northern and eastern Gaza's 58 km border. This security zone occupied 29 km^2 (8%) of Gaza's area to remain under the Israeli Army's control. When the Palestinian second Intifada broke out in September 2000, the Israeli Army expanded the area of the security zone unilaterally by few hundred meters (width ranges between 0.8 and 1.30 km). The area became off limit to Palestinians to build, cultivate, or just be there. By the time the Israeli Army completed their redeployment in Gaza by the end of 2005, the security buffer zone area stood at 61 km^2 (17%) of the Gaza Strip area under the Israeli Army occupation. In June 28, 2007, and in a unilateral step, the Israeli Army expanded the security buffer zone along Gaza's northern and eastern border to 1.5 km width. Accordingly, the newly defined security buffer zone, occupy an area of 87 km^2 (24%) of the Gaza Strip area(Map 2.2). The following table shows the timeline of the Israeli security zone around Gaza's border.

Timeline of Israeli security buffer zone around Gaza's border

Status in years	Buffer zone Width along 58 km	Area in km^2	Percentage of Gaza's area
1994*	500 m	29	8
Sept- Dec 2005**	800-1300m	61	17
June2007**	1500m	87	24

* Agreed upon in Oslo 1994
** Unilaterally carried out by Israel

Map 2.2 Israel unilateral expansion of security zone around Gaza 's border

Israeli Violation in the Occupied Palestinian Territory

Since the Israeli Occupation of the Palestinian Territory back in 1967, the people, their property has been targets of the Israeli consecutive governments, starting with land confiscation for so-called security purposes to property destruction for building without legal permits and trees uprooting. Over the years of the Israeli occupation, Israel resorted to destruction of Palestinian properties as an indirect mean to inflict the internationally prohibited "collective punishment"; more than that; Israel has managed to carryout its scheme in the OPT; to build illegal settlements for its citizens and construct a network of bypass roads to connect the settlements in the OPT together and to Israel. The Israeli actions in the OPT during the time of it ongoing occupation constitutes as articulate within the Geneva Convention of 1949 a "grave Breach" of the international law. Now with the Israeli -under construction- Segregation Wall; Israel has managed to take its aggression against the Palestinians to a new level of infringements as the actions of the Israeli State is threatening the very existence of Palestinians on their lands as they are being economically squeezed by the Israeli measures more than ever before.

Israel's House Demolition Policy

The long and extensive history of the ingoing Israeli house demolition policy in the OPT does not only constitute a grave breach of Palestinian right to housing, but also an application of the prohibited "collective punishment" as emphasized in the Fourth Geneva Convention of 1949; Article 33, which strenuously rebut without exception; infliction of punishment on an individual/s for an act committed by another.

Art. 33. No protected person may be punished for an offence he or she has not personally committed. Collective penalties and likewise all measures of intimidation or of terrorism are prohibited.

In addition to article 33 of the Geneva Convention, Israel's house demolition policy in the OPT was never based on military necessities as indicated in Article 53 of the Convention but merely on vindictive reasons as collective punishment and in Jerusalem; house demolition is carried out to clear Palestinian houses for the illegally built Israeli settlements.

Art. 53. Any destruction by the Occupying Power of real or personal property belonging individually or collectively to private persons, or to the State, or to other public authorities, or to social or cooperative organizations, is prohibited, except where such destruction is rendered absolutely necessary by military operations.

Land Confiscation

Like people and property, Palestinian agricultural and cultivated lands were always standing targets and witnesses of the Israeli Occupation aggression against Palestinians. Lands destroyed and poisoned, trees uprooted are all patterns of Israeli Army and settlers' hostilities against anything Palestinians. Prior to the time when the Segregation Wall started back in 2002, Israel used to confiscate Palestinian's lands in the Occupied West Bank to build and expand settlements or to construct and increase the bypass roads network.

However, with the instigation of the Israeli Segregation Wall, the concept to continue confiscating Palestinian lands remained, even though; now the purpose of confiscation is far more grievous goes beyond the tangible outcome, which is to build the Segregation Wall; as it adamant to capture 555 km^2 (approximately 10%) of the Occupied West Bank area.

Table 2.9: Israeli Violations in the OPT between 1994-2006

Total in Year	Land Confiscated	Houses Demolished
1994	23902	57
1995	1300	14
1996	31734	12
1997	72761	295
1998	38147	118
1999	28073	53
2000	12008	25
2001	25988	89
2002	18707	495
2003	86709	1301
2004	54096	1585
2005	40156	190
2006	6605	229
Total	**440186**	**4463**

Photo 2.3 Israeli Army unit supervising house demolishing process in Al Walajah village

Uprooting Trees

The Israeli Army systematic attack on Palestinian trees has started early with the Israeli Occupation back in 1967 and resulted in the uprooting of more than 1000,000 trees until 1999. However, and with the beginning of the current Intifada in the year 2000, Israel has intensified its belligerent attack on the Palestinian agriculture and trees in particular for many reason, the most proclaimed of which is "for security purposes", that is to say; to establish more military bases, security buffer zones to settlements and bypass roads, but the real turn started with the Segregation Wall in the year 2002 when Israel started the organized crush of the agricultural lands and started uprooting hundreds of thousands of trees to set the route for the Segregation Wall (Table 2.10)

Table 2.10: Number of trees uprooted from Palestinians' lands by the Israeli Army and settlers throughout the West Bank's & the Gaza Strip's Districts in the period between September 2000 –December 31, 2006

WB Districts	Uprooted Trees	Gaza Strip Districts	Uprooted Trees
Jenin	14,707	Northern Gaza	602,208
Tubas	1,228	Gaza	186,737
Tulkarem	14,934	Deir Al-Balah	124,723
Nablus	53,746	Khan Yunis	132,656
Qalqiliya	16,237	Rafah	74,446
Salfit	17,926		
Ramallah	14,082		
Jericho	25,537		
Jerusalem	3,558		
Bethlehem	66,521		
Hebron	56,412		
Total	**284,888**	**Total**	**1,120,770**
WB & Gaza Strip Grand Total	**1,405,658**		

Trees include Olive, Citrus, Stone Fruit, Forestry, Date Palm, Banana, Grape, others.

Photo 2.4: Israeli Army Bulldozer uprooting dozens of olive trees to set the route for the Segregation Wall

2.7 West Bank Landuse/ Land cover Analysis

Analysis of satellite images for the West Bank between 2004 and 2006 shows the changes on the ground with regard to Landuse/ Land cover. Palestinian built-up witnessed an increase by 27 km^2 to 292 km^2, putting the population density at 8,373 people per 1 km^2. At the same time the Israeli settlements' built-up area has seen 6 km^2 increase, to an overall area of 188 km^2, with population density at 2,580 people per 1 km^2. This conspicuous difference is attributed to the Israeli control over Palestinian owned lands, where utilization of land by the Palestinians is restricted by Israeli military orders, thus causing an overload of available space within Palestinian controlled areas. Palestinian agricultural areas did not witness any significant change in it status mainly to the fact that Israeli Army increased restrictions on land use. Moreover, the undergoing construction if the Israeli Segregation Wall had immense repercussions on developing plans of the agricultural areas. In the Gaza Strip, 24% (87 km^2) still falls under Israeli control. Table 2.11 and 2.12 shows the Landuse/ Land cover of the West Bank 2006, and Gaza Strip 2005.

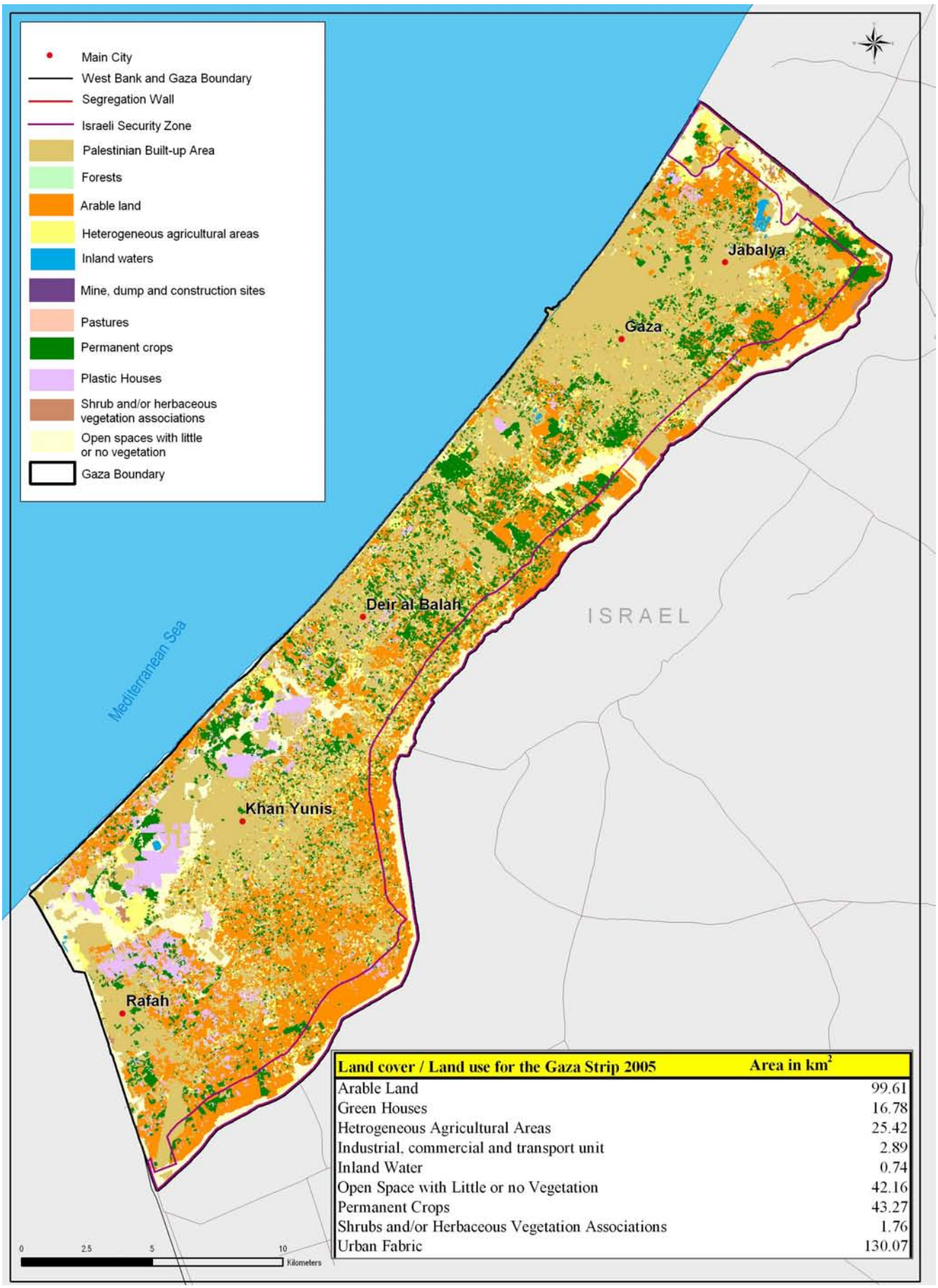
Table 2.11: West Bank Landuse/Land cover 2006

Item	Area/ km²
Arable land	**951**
Heterogeneous agricultural areas	**193**
Pastures	**552**
Permanent crops	**1172**
Plastic Houses	**12**
Artificial non-agricultural vegetated areas	**0**
Industrial, commercial and transport unit	**5**
Mine, dump and construction sites	**24**
Palestinian Built-up Area	**292**
Israeli settlements	**186**
Israeli Military Base	**47**
Forests	**71**
Open spaces with little or no vegetation	**1884**
Shrub and/or herbaceous vegetation	**264**
Wall zone	**6**
Inland waters	**1**
Total	**5661**

Table 2.12 : Gaza Strip Landuse/Land cover 2005

Item	Area/ km²
Arable Land	99.61
Green Houses	16.78
Heterogeneous Agricultural Areas	25.42
Industrial, commercial and transport unit	2.89
Inland Water	0.74
Open Space with Little or no Vegetation	42.16
Permanent Crops	43.27
Shrubs and/or Herbaceous Vegetation Associations	1.76
Urban Fabric	130.07
Total	**362.704**

Map 2.3: West Bank Landuse/ Land Cover 2006



Land cover / Land use for the Gaza Strip 2005	Area in km^2
Arable Land	99.61
Green Houses	16.78
Hetrogeneous Agricultural Areas	25.42
Industrial, commercial and transport unit	2.89
Inland Water	0.74
Open Space with Little or no Vegetation	42.16
Permanent Crops	43.27
Shrubs and/or Herbaceous Vegetation Associations	1.76
Urban Fabric	130.07

Map 2.4: Gaza Strip Landuse/ Land Cover 2005

2.8 Outlook

The year 2005 was particularly characterized with truth revelation; outlining the doctrine of Israel position toward moving forward in the peace process with the Palestinians. Unilateralism is the one word that actually underlines the Israeli activities since their theatric disengagement (but in fact more of redeployment) from the Gaza Strip in September 2005. It is true that such stance is not far from Israeli activities previously carried out in many occasions, the most notable of which would be the Gaza Strip unilateral disengagement in addition to four settlements located north of the West Bank.

However, Israel has much more to contemplate about its disengagement from areas massively dominated by Palestinians with a single convection in mind and that is the only way to achieve its plan would be to act on its own merits and inflict realities that will make the other side compelled to deal with and except; in another and single word; unilateralism. Evidently, Israel imposed its will by September 2005 and were able to rope in its entire plan by carrying a unilateral disengagement from the Gaza Strip after 38 years of occupation according to its terms unfettering and disowning its responsibilities as an occupier of massive Palestinian population and relocating its control to the outskirts of the Gaza Strip; including the crossing points of individuals and goods.

Israel has also managed to portray its unilateral disengagement from the Gaza Strip as an initiative step toward the peace process; while in fact, the unilateral disengagement has presented an eluding opportunity from a life and economic drainage situation with world applause and hefty compensation to the illegal settlers who lived in the illegally stamped settlements, discarding at the same time all the violations it committed throughout its years of occupation with an opportunity to replicate its notorious and rewarding the Gaza Strip disengagement again in the West Bank.

Unlike typical Israeli related activities in the OPT (massive land confiscation paralleled by enormous expansion of settlements areas and sizeable increase in settlements housing units), the year 2005 was characterized with a strategic development in relation to Israeli activities; a consolidation of years of work in land confiscations, settlement building and expansion and carving up the OPT to the point that it became apparent that Israel is proceeding with systematical steps to undermine any chances for peace and makes it unfeasible for the Palestinians to establish an independent, contiguous state of their own.

The Segregation Wall along the western terrains of the West Bank isolating nearly 10% (555 km^2) and the impounding of the Eastern Segregation Zone along the eastern terrains of the West Bank isolating 1555 km^2 (27.5%) along with 19% (1085 km^2) of the West Bank classified as area "C" (under complete Israeli control) implicate Israel's intentions toward ever achieving a peace agreement with the Palestinian, other than what originate under its unilateral and illegal applications on the ground. Furthermore, statements made by several Israeli figures clearly shows premeditated plan on the Israeli side to fragment occupied West Bank, encompass vast areas of the West Bank to Israel by manipulating the objective of the Segregation Wall from what the Israeli called " a security fence" to a demarcation tool of the Israeli border; accommodating in the process more than 400,000 Israeli settlers and 6 settlements blocs.

Israel relentlessness to persuade its colonization program in the OPT has only contributed to challenge the viability of the prospect of a two sate solution where an Israeli State and a Palestinian State living side by side.

It is always important to keep emphasizing what has become clear with unanimous concession that the Palestinian–Israeli conflict has only the referendum choice of the international law to resolve their long dragged struggle; particularly the resolutions 242 and 338 of the United Nations Security Council, which alienate the inadmissibility of territorial acquisition by means of war with an emphasis on "Withdrawal of Israeli armed forces from territories occupied in the recent conflict; Termination of all claims or states

of belligerency and respect for and acknowledgement of the sovereignty, territorial integrity and political independence of every State in the area and their right to live in peace within secure and recognized boundaries free from threats or acts of force;".

These resolutions also "affirm further the necessity for achieving a just settlement of the refugee problem; and request the Secretary General to promote agreement and assist efforts to achieve a peaceful and accepted settlement in accordance with the provisions and principles in this resolution;" Furthermore the international law stamp all Israeli settlements build in territories occupied during the 1967 war and its residents; with illegal status as stated in Article 49 of the Fourth Geneva Convention of 1949.

The International Court of Justice (ICJ) ruling of July 9, 2004, confirmed that the entire West Bank and Gaza Strip, including East Jerusalem, are territories under occupation by Israel, and are therefore protected by the Fourth Geneva Convention. This makes all Israeli settlements and population transfers illegal as Article 49 states, "The Occupying Power shall not deport or transfer parts of its own civilian population into the territory it occupies."

The continued Israeli manipulation of the peace process is a major and only source of the upsets that over shadowed the peace process as the Israeli political establishment continues to elude its duties and responsibilities to the peace process and deny Palestinians of their manifested right as conceded in the "Madrid" and "Oslo Accord" for a guaranteed independent, occupation free State of their own within an agreed time frame.

However, Israel's persistence not to seize its colonial activities; constitute the foremost cause to the existence of the Israeli Army in the OPT allegedly to protect the Israeli settlers; all at the expense of the daily life of the Palestinian population who would experience disruption and humiliation with the frequent collective punishment of closures, house demolitions, withdrawal of identification cards, the confiscation of private property; committed by the Israeli Army being the empowered instrument of the political establishment that aims to break-up the OPT into disconnected cantons to discard the option of an independent Palestinian State.

"Neither side shall initiate or take any step that will change the status of the West Bank and the Gaza Strip pending the outcome of the permanent status negotiations".

The 1995 Interim Agreement (Chapter 5, Article XXXI, paragraph 7)

The Palestinians has always rejected all the Israeli unilateral acts to build new settlements or expand existing ones especially that it was stated in the Oslo Accord that none of the parties involved shall take any measures during the interim period that might alter the final status of the negotiation. However, Israel has made it clear that it has no intention to halt its settlement program; in fact decades of illegal settlements related activities is now being consolidated in the ultimate breach to the international law, that is the Segregation Wall.

The following table (2.13) shows the distribution of areas controlled by Israelis and Palestinians in the West Bank and Gaza Strip.

Table 2.13: Distribution of Areas controlled by Israelis and Palestinians in the West Bank and Gaza Strip

West Bank	Area 5661 km²	100%	Remarks
Palestinian control	2208 km²	39%	This includes areas A+B & nature reserves
Area «C»	1341 km²	23.7%	Under Israeli control falls between western Segregation Wall and eastern Segregation Zone and might be subject of future negotiation
Israeli control	2112 km²	37.3%	Include western Segregation Zone and eastern Segregation Zone
Gaza Strip	**362 km²**	**100%**	**Remarks**
Palestinian control	275 km²	76%	Including areas surrendered to the Palestinian Authority following the Israeli withdrawal in September 2005, including Rafah international crossing where Palestinians have limited control.
Israeli control	87 km²	24%	Security buffer zone area along the eastern and northern border of Gaza Strip, including 7 crossing/ terminal points

With regard to the Gaza Strip, Israel has managed to portray its unilateral disengagement from the Gaza Strip as a step towards peace; while in fact, the unilateral disengagement has created a massive downturn in the standard of living and economic situation in the Gaza Strip, whilst allowing Israel to divest itself of its responsibilities as an Occupier. In the meantime, the world has applauded the move, and hefty compensation were rewarded to the displaced illegal Israeli settlers, whilst no similar action was adopted for the beleaguered Gazans population; whose land was stolen and property and infrastructure has been destroyed by repeated Israeli military operations.

It is always important to keep emphasizing that an end to the Israeli Occupation of the Palestinian Territories is a move required under international law. Resolutions 242 and 338 of the United Nations Security Council, which alienate the inadmissibility of territorial acquisition by means of war require: *"Withdrawal of Israeli armed forces from territories occupied in the recent conflict"; "Termination of all claims or states of belligerency and respect for and acknowledgement of the sovereignty, territorial integrity and political independence of every state in the area and their right to live in peace within secure and recognized boundaries free from threats or acts of force".* These resolutions also affirm further *"The necessity for achieving a just settlement of the refugees' problem; and request the Secretary General to promote agreement and assist efforts to achieve a peaceful and accepted settlement in accordance with the provisions and principles in this resolution".* Furthermore, international law designates all Israeli settlements built in territories occupied during the 1967-war as illegal in status as confirmed in Article 49 of the Fourth Geneva Convention of 1949.

Israel's manipulation of peace agreements with its unilateral steps and continued attacks on the OPT and its persistence to continue with the settlements' program and building the Segregation Wall are the direct affects derailing of the peace process, as the Israeli political establishment continues to elude its duties and responsibilities according to the peace process and deny Palestinians of their basic rights as conceded in the "Madrid" and "Oslo Accord" for a guaranteed independent, occupation free State of their own within an agreed time frame. Israel's persistence in colonial activity constitutes the foremost reason for the presence of the Israeli Army in the OPT, allegedly to protect the Israeli settlers; at the expense of the daily life of the Palestinian population who continue to experience on a daily bases from decades to come; disruption and humiliation with frequent collective punishments of closures, houses demolitions, withdrawal of identification cards, the confiscation of private property and much more.

The name for such formation maybe argued "Security", "Segregation" or "Isolation" whatever it is; surely it will bring no peace to the area especially if it is imprisoning, tearing, and threatening the lives of millions.

The Palestinian-Israeli issue dictated politics in the Middle East region for decades. It even was a grounding issue on relations between Arab and other countries of the world in every aspect: economical, political, social. The standing of countries on the Palestinian-Israeli issue ultimately defines the nature of relation between Arabs and that country. However, the "Peace Accords" signed between the Palestinian Liberation Organization (PLO) and the Israeli State has drifted from the spirit it was commanded with, more than that; the Israeli consecutive governments violated it comprehensively. Construction of Israeli settlements has never stopped, Israeli bypass roads still slashing the Palestinian communities, penetrating and expropriating lands, uprooting trees and placing Palestinians in cantons; detached from one another by the bypass roads, settlements and now; with the Segregation Wall. The peace accord signed between the Palestinians and Israelis was in fact an interim agreement towards a final peace treaty between the two parties and for this end the Palestinians agreed to fragment the West Bank and Gaza Strip territories into three categories; Areas "A", "B" & "C". The crave peace in the Middle East; particularly between Palestinian and Israelis can only be realized through the international community commitment to achieve a "Righteous" peace; recognizing the Palestinian tragedy and restore the Palestinian their rights in acknowledgment of the United Nations resolutions:242 & 338.

Today, 15 years following the first signing of the Declaration of Principals in September 1993 and the formation of the Palestinian National Authority (PNA), the very stability of the latter stands in question at this time; more precisely, its sovereignty and thus ability to endure. Israeli troops still to this day ravish the Palestinian controlled areas; killing, arresting, demolishing, etc; and not even questioned or denounced by the world. The sovereignty of future Palestine remains debatable by many; issues remain ambiguous will most defiantly endanger future negotiations between Palestinians and Israelis. The borders, refugees, airspace, natural resources, water rights and land use; are all issues in-need of thorough and extensive negotiations to meet the minimal demands of Palestinians.

Over the years, local (Geneva), regional (Saudi Arabia) and international (Roadmap) initiatives were put forward as positive prospects to resolve the Palestinian-Israeli conflict, but none of them was positively received by Israel. In fact, Israel has almost discarded them completely.

Close to 15 years have passed by since the Israelis and Palestinians signed the Oslo Accord that seems today ambiguous and far-fetched from the spirit, in which the agreement (Oslo Accords) was based on; with evident Israeli thoughts for an autonomous but crippled, detached and dependant (on Israel) Palestinian State, at the time the Palestinian yearn and aspire for an independent contiguous state.

Chapter Three

3

Demoghraphy

3.1 Introduction

The political changes, the Israeli Occupation and restrictions have affected all aspects of life for the Palestinian people in the Occupied Palestinian Territory (OPT) and, to a lesser extent, the Palestinian Diaspora. The region has witnessed demography and social changes. as a result of the 1948-war, 78% of Mandate Palestine was taken to form what is presently known as the State of Israel, where some of the Palestinians were evicted from their land and home while Palestinians who stayed in their homeland where considered Israeli citizens. As a result of the 1967-war, the rest of Mandate Palestine (22%) has been under Palestinian National Authority (PNA) control and known the OPT. Currently, the total Palestinian population living in Mandate Palestine is estimated at 5.5 million, of which some 4.3 million live in the OPT and about 1.2 million in Israel. In addition, there are about 5.9 million Israelis, of Jewish faith, living in Mandate Palestine, of which, 5.4 million in Israel and about 0.5 million in Israeli settlements built illegally on Palestinian lands in the OPT.

3.2 Demography Status

3.2.1 Population in the Diaspora

The Palestinian population all over the world was estimated by the end of the year 2006 to total about 10.1 million, distributed over the OPT, Israel and abroad. 39.2 % of them live in the OPT, 27.7% in Jordan, and 16.2% in other Arab countries, 11.2% inside the Green Line, and 5.7% in foreign countries. The total number of Palestinians in Israel was estimated at the end of the year 2005 to be 1,134,000 with an annual growth rate equaling 3%. However, the total number of Palestinians in Israel after the Palestinian Catastrophe (Nakba) of 1948 was about 714,000 inhabitants (PCBS, 2006).

3.2.2 Population in the OPT

In 1997, the Palestinian Central Bureau of Statistics (PCBS) conducted the First Census in the OPT. The results indicated that the actual total population living in the OPT was 2,895,683 inhabitants, of which 1,873,476 inhabitants were living in the West Bank, including East Jerusalem, and 1,022,207 were living in the Gaza Strip. Based on the 1997-Census data, the PCBS projected the total population of the OPT until the year 2015. The projected population of the OPT by the middle of 2006 was 3,888,292 inhabitants, with annual growth rate about 3.3%. Approximately 53.5% of the total Palestinian population lives in urban areas (46.7% in the West Bank and 63.7% in the Gaza Strip) and the remaining 46.5% of the population is distributed in rural areas and refugee camps.

The estimated number of males in the OPT at the middle of the year 2006 was 1.97 million and 1.92 million females; the sex ratio is 102.7 males per 100 females. The population's age structure in the OPT indicated that the Palestinian community is young. About 45.5% of the total population are less than 15 years old, while 3.0% of the population are above 65 years old (PCBS, 2006). This is due to the high fertility rate and decline in child mortality. Figure 3.1 shows population pyramids, presenting the age group and gender distribution of the 2006 population in the OPT.

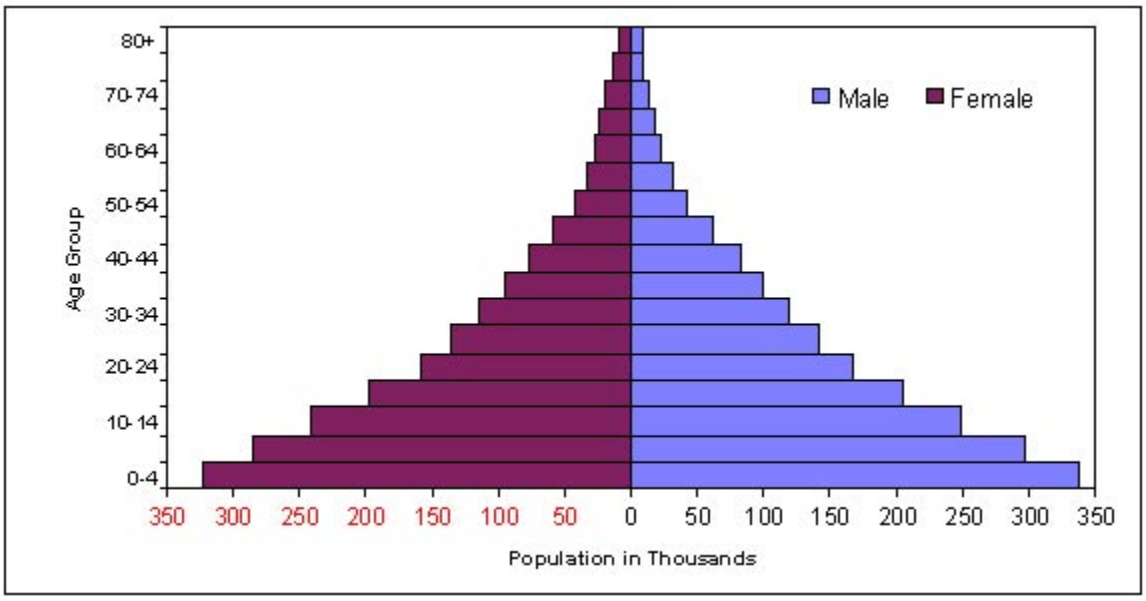


Figure 3.1: Population distribution by gender and age group in the OPT, 2006

Figure 3.2 shows areas "A", "B", "C" as well as "Nature Reserves" classification in the West Bank, according to the Oslo Agreement of 1995, and in addition to the Palestinian population distribution in these areas. The Figure indicates that 83.6% of the Palestinian population living in Area "A" and "B", while 16.3% of the Palestinian population living in Area "C". However, Area "A" and "B" comprises 36.1% of the total West Bank area while Area "C" comprises 64.5% of the total West Bank area.

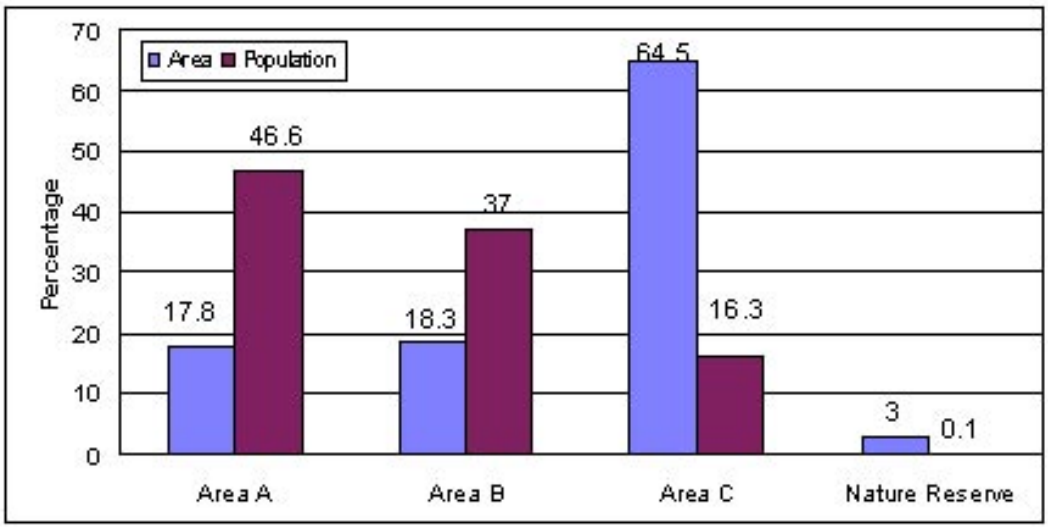


Figure 3.2: Population and area distribution according to Area "A", "B", "C" and Nature Reserve division

The administrative divisions of the OPT are comprised of 16 Palestinian Governorates; 11 in the West Bank and 5 in the Gaza Strip. According to the "Local Community Survey", conducted by the PCBS in 2005, the total number of Palestinian local authorities is 479 in the West Bank and 30 in the Gaza Strip.

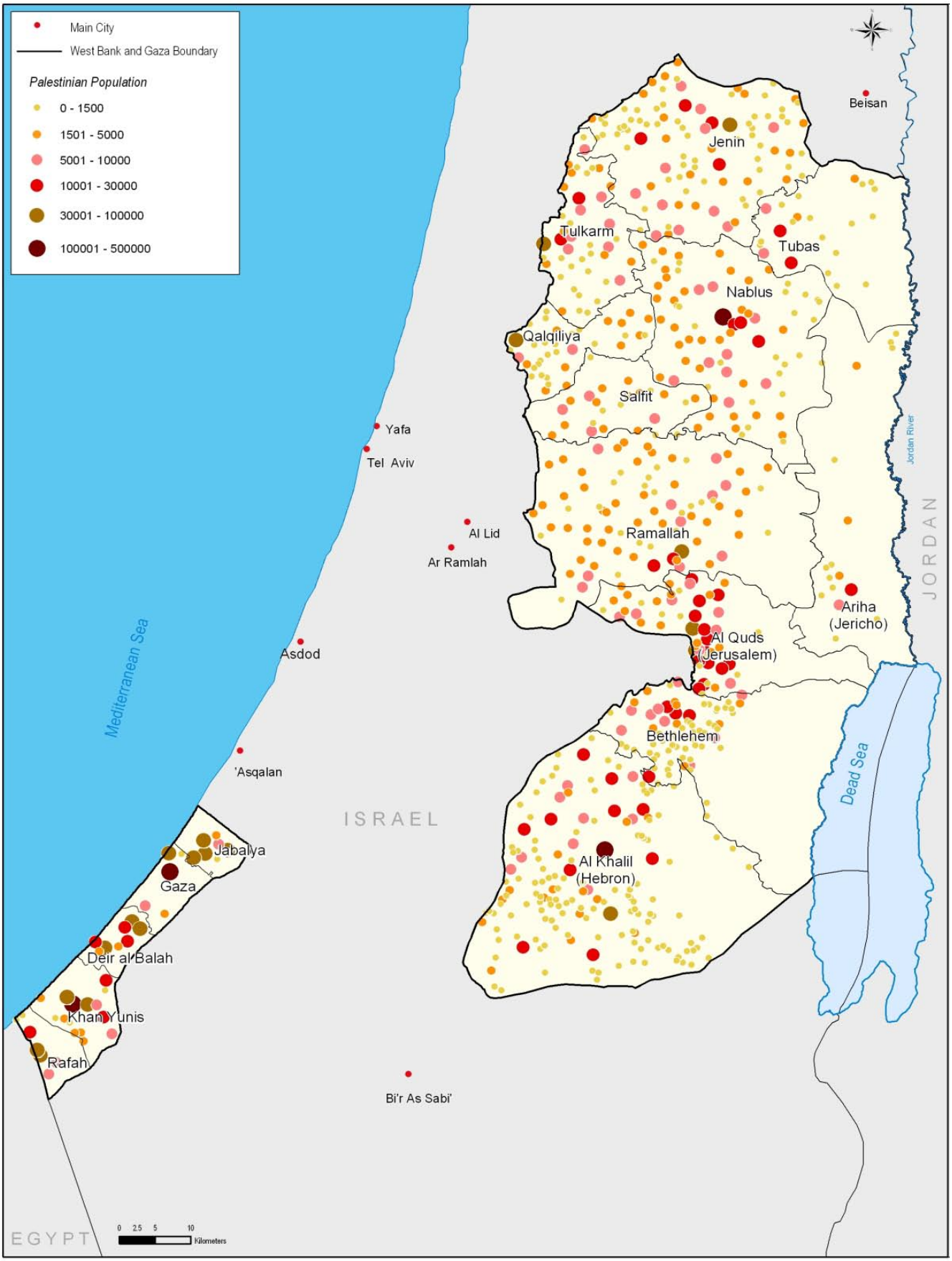
Table 3.1 shows that the Hebron Governorate has the highest population (542,593) in all of the Palestinian Governorates, which amounts to 14% of the total population of the OPT; the Gaza Governorate has the second highest population (505,702), which amounts to 13% of the total population. On the other hand, the Jericho and Tubas Governorates have the lowest populations (43,620 and 48,128, respectively), which amount to 1.12% and 1.24% of the total Palestinian population in the OPT, respectively.

Table 3.1: Distribution of local authorities in the Palestinian Governorates by type of local authority. Source: MOLG 2006, UNRWA 2006

Governorate	Population	Area in km²	Number of Local Authorities
Palestinian Territory	**3,888,292**	**6,023.51**	**509**
West Bank	**2,444,478**	**5,660.8**	**479**
Jenin	261,756	572.7	**79**
Tubas	48,128	366.0	**16**
Tulkarm	172,793	245.3	**35**
Nablus	336,380	613.6	**62**
Qalqiliya	97,472	174.4	**33**
Salfit	64,129	202.0	**19**
Ramallah & Al-Bireh	290,401	848.8	**73**
Jericho and Al Aghwar	43,620	609.0	**11**
Jerusalem	407,090	353.7	**30**
Bethlehem	180,116	607.9	**41**
Hebron	542,593	1,067.5	**80**
Gaza Strip	**1,443,814**	**362.7**	**30**
North Gaza	278,180	60.4	**5**
Gaza	505,702	73.6	**5**
Deir AL-Balah	208,716	57.1	**8**
Khan Yunis	279,853	111.6	**8**
Rafah	171,363	59.98	**4**

OPT: the West Bank (including east Jerusalem) and the Gaza Strip

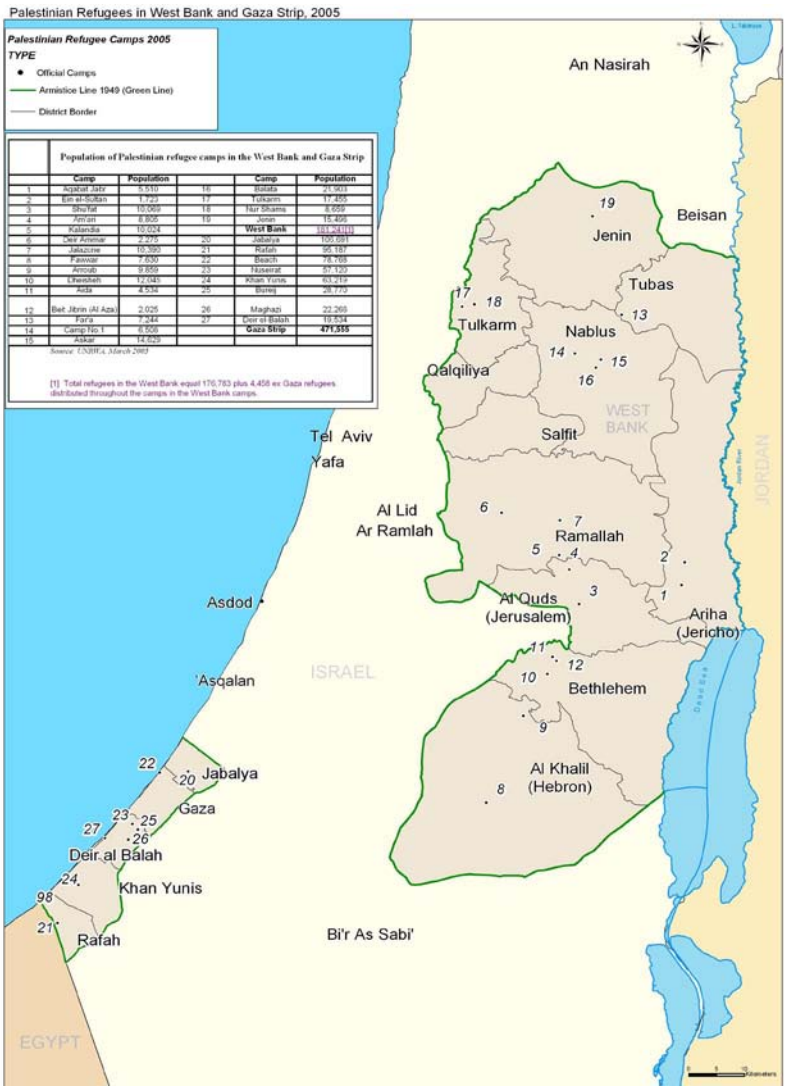
The continuing growths in population increase the population density in Palestinian localities. The average population density in the West Bank reaches 432 capita/km² of the total area, while in the Gaza Strip it reaches 3,981 capita/km² of the total area. However, considering the population density within urban areas, the population density reaches 6,842 capita/km² of the total built-up area in the West Bank and 7,485 capita/km² of the total built-up area in the Gaza Strip. Map 3.1 illustrates the population built-up areas according to the population ranges.



Map3.1: Distribution of Palestinian built-up areas in the OPT, classified according to population ranges, 2007

The 1948-war in Mandate Palestine resulted in the eviction of over 714,000 Palestinians from their lands and homes, forcing them to become refugees in the neighboring Arab countries, the West Bank and the Gaza Strip. Most of these were owners of properties and land, which are currently part of the Stat of Israel. Moreover, about 30% of the displaced persons of 1967, that is around 175,000 UNRWA registered refugees, were refugees of 1948 and their descendents, forced to flee for a second time. These Palestinians, who have been refugees for the last 59 years, are still denied the Right-to-Return to their lands. Presently, and according to the United Nations Relief and Works Agency (UNRWA) for Palestinian Refugees in the Near East, there are 27 refugee camps in the OPT; 19 in the West Bank and 8 in the Gaza Strip (UNRWA, 2005). Due to natural growth, Palestinian refugees have grown in number to about 4.3 million by mid-2005, 1.6 million living in the OPT and the remaining 2.7 million forced to leave the camps due to overcrowding and lack of housing (PCBS, 2006).

16% of the total refugees, residing in the West Bank (where make up 27.2% of the total population in the West Bank); and 22.6% of the total refugees, residing in the Gaza Strip (which makes up 68.4% of the total population in the Gaza Strip). 15% of the total refugees in the OPT live in camps. According to the UNRWA data, population density in the refugee camps is generally high, exceeding 50,000 persons per km2 in some camps, particularly in the Gaza Strip. In the West Bank camps, the population densities are low compared to the population densities of the camps in the Gaza Strip. In the Gaza Strip, the refugee camps have one of the highest population densities in the world (on average about 54,015 capita/km^2) (PCBS, 2006) (Map 3.2).



Map 3.2: Palestinian Refugees in the West Bank and Gaza Strip

3.2.3 Population Projections

According to the PCBS projections, the population of the OPT increased by 35% for the period 1997-2005. In the West Bank, the population increased by 32.7% and by 39.6% in the Gaza Strip. The projection indicated that the Palestinian population will increase to reach 5.9 million by the year 2020 with an increase of about 111% between 1997-2020. The projected indicated that the population will reach 3.6 million in the West Bank and 2.3 million in the Gaza Strip by 2020 with an increase by 100% in the West Bank and 131% in the same period. (Figure 3.3)

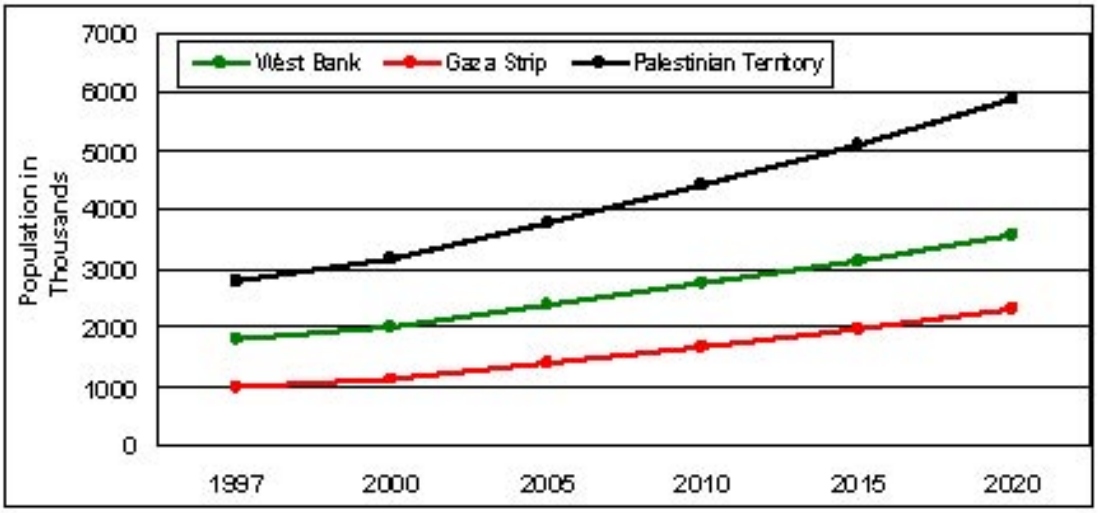


Figure 3.3: Palestinian population projection in the OPT of the period from 1997-2020 (PCBS, 2006)

3.2.4 Human Trends

According to the PCBS data, the growth rate in the OPT reached 3.3% in 2006. This percentage is high compared to other countries. The crude birth rate reached 36.7 births per 1,000 people and the crude death rate reached 4.0 deaths per 1,000 people in 2006. The Infant Mortality Rate (IMR) reached 20.8 per 1,000 live births, and the annual average IMR in the last five years was 22.5 per 1,000 live births in 2005 (PCBS, 2006).

The fertility rate is high in the OPT, which is due to social and economic reason such as the desire of Palestinian families to have many children and to the early marriages among females. The Total Fertility Rate (TFR) declined to reach 4.6 births per woman in 2006, in comparison to 6.04 in 1997. The average life expectancy at birth for Palestinians increased between 1997 and 2006 to reach 71.7 years for males and 73.2 years for females in 2006, in comparison to 70.2 years for males and 71.7 years for females in 1997.

These improvements in human trends represent the improvement in the living standards, health services, and health awareness among people (PCBS, 2006). Table 3.2 shows that Palestinian populations in the West Bank and the Gaza Strip, as well as the Palestinian in Israel have the highest rates compared to other countries.

Comparing the IMR between the Arab countries and foreign countries, it seems that it is higher in the Arab countries in general than in elsewhere countries (Table 3.2).

Table 3.2: Comparative human trends

Country/ Region	Annual Growth Rate	Crude Birth Rate	Crude Death Rate	Total Fertility Rate (TFR)	Life Expectancy	Infant Mortality Rate (IMR)
OPT	3.3	36.7	4.0	4.6	72.5	20.8
Palestinians in Israel*	3.0	30.9	2.7	4.0	76.6	8.3
Israel**	1.8	21.3	5.5	2.9	79.7	4.9
Jordan***	2.3	27.8	7.0	3.7	71.5	24.0
Syria****	2.5	23.4	2.8	3.6	70.0	24.0
Lebanon #	1.2	NA	NA	2.2	73.5	28.0
Egypt ##	1.8	NA	NA	3.3	70.2	35.0
Canada ###	0.9	10.9	7.7	1.6	80.0	4.8
USA ###	0.88	14.4	8.3	2.1	77.9	7.0

** Source: PCBS, 2006. ** Source: Israeli Central Bureau of Statistics (ICBS), 2006*
****Source: Jordan in Figures, 2005. ****Source: Statistical Abstract 2002, Syrian Arab*
 # Source: Socio-economic Indicator for Lebanon, UNDP, 20006. ## Source: UNDP, 2006
Source: U.S. Census Bureau, Statistical Abstract of the United State, 2006
NA: Data is not available.

3.3 Social Trends

3.3.1 Marital Status

The social trends in the OPT improved during the last ten years, where the median age at first marriage increased to reach 25.2 years for males and 19.6 years for females in the West Bank, and 24.1 years for males and 19.1 years for females in the Gaza Strip, in 2005. The increase in the median age at first marriage indicates an increase in reproductive awareness among both women and men, as well as an increase in their desire to complete their higher education before marriage. The crude marriage rate and crude divorce rate reach 7.7 marriages per 1,000 people and 1.1 divorces per 1,000 people respectively (PCBS, 2006).

3.3.2 Housing

Housing and urban planning trends have been affected by the Israeli Occupation. With the restrictions on land, the area available for building became smaller, which led to a lack of housing units and overcrowding in the housing units. However, the housing density decreased slightly in the OPT from 2.0 to 1.8 persons per room during the period 1997-2006. The average housing density in the West Bank reached to 1.8 persons per room and 1.9 in the Gaza Strip.

About 41.9% of the Palestinian households in the West Bank and 35.7% in the Gaza Strip live in housing units with 1-1.99 persons per room. The highest percentage of households living in housing units with more than two persons is found in the Gaza Strip (54.5%), while in the West Bank, the highest percentage of households is found in households living in housing units with less than two persons (54.6%).

If the current situation continues, and the population increases, then this will lead to a shortage in the housing units and to a future deterioration of the Palestinian households' living conditions. The PCBS projected the housing units needed in the next five years (2006-2010) to be 130,000 new housing units. During the period 2000-2005, about 141,000 new housing units were needed in the OPT (with 91,000 in the West Bank and 50,000 in the Gaza Strip).

Three scenarios were put forward for the OPT by the PCBS in 2005 to project future population, households and housing units. The first, "Low Growth Scenario" assumes that the economic situation will deteriorate as a result of slow economic growth; the second, "Medium Growth Scenario" assumes that the economic situation will remain the same; and the third, "High Growth Scenario" assumes an improvement in the economic situation. Table 3.3 shows the results of the projection.

Table 3.3: Percentage increase in population, households and housing units during the period 2005-2020 according to the three scenarios in the West Bank and the Gaza Strip (PCBS, 2005)

Scenario	West Bank			Gaza Strip		
	Population	Households	Housing Units	Population	Households	Housing Units
Low Growth Scenario	43.1%	43.1%	43.1%	50.9%	50.9%	50.9%
Medium Growth Scenario	51.1%	51.1%	51.1%	65.2%	65.2%	65.2%
High Growth Scenario	70.6%	70.6%	70.6%	82.9%	82.9%	82.9%

Since the eruption of the Second Intifada, the Israeli Occupation Forces (IOF) have demolished many Palestinian houses under the pretext of "security reasons", so as to build Israeli settlements and/or to construct the Segregation Wall. Between 2000 and 2006, the total number of Palestinian houses demolished in the West Bank was 1,934. In the Gaza Strip, the Israeli house demolitions were more intensive where the number of Palestinian houses demolished between 2003 and 2006 was 4,863 (ARIJ Database, 2006).

However, the housing conditions in the OPT improved during the last ten years, where about 90.8% of the OPT housing units had access to water public network, 99.2% had an access to public electricity networks, and 54.0% were connected to sewage public network as in 2006. While in 1997, the percentage of housing units in OPT, connected to water, electricity, and sewage public network, was 83.6%, 99.9%, and 33.7% respectively.

3.3.3 Education

In 1994, the Ministry of Education and Higher Education (MOHE) took control over the educational system in the OPT after 27 years of the Israeli Military Control. Since then, MOHE has tried to modify the system to match current needs and to develop the curriculum to an acceptable standard. As a result, almost all of the children attend school up to the age of 12 years, where the enrollment rate in the basic education is almost 100%. Moreover, the literacy rate in the OPT has increased from 84.3% to 93.9% for the years 1995-2006. This increase is higher among females than males. It increased by 16.6 % among females and by 6.1% among males for the period 1995-2006. It is believed that this is a result of a shift in attitude concerning females' education, along with better financial resources within families before the economic downturn that followed the outbreak of the Second Intifada (PCBS, 2006).

The main supervising authority for schools in the OPT is the governmental sector (Palestinian National Authority "PNA"), although some schools are supervised by the UNRWA and some are private. All the Palestinian localities have governmental schools, while the private schools are mainly distributed in the cities. The statistics of the scholastic year 2005/2006 indicated that there were about 2,277 schools in the OPT.

Table 3.4: Distribution of Schools by Supervision Authority in 2005/2006

District/Directorate	Governmental	Private	UNRWA	Total
OPT	**1,726**	**272**	**279**	**2,277**
West Bank	**1,380**	**244**	**92**	**1,716**
Jenin	113	10	7	**130**
Nablus	196	24	14	**234**
Salfit	57	2	0	**59**
Tulkarm	107	9	7	**123**
Qalqiliya	67	6	3	**76**
Ram Allah	159	35	12	**206**
Jerusalem Sub.	55	32	9	**96**
Jerusalem	37	43	7	**87**
Bethlehem	100	28	7	**135**
Jericho	20	3	3	**26**
Hebron	207	38	8	**253**
South Hebron	159	8	8	**175**
Qabatya	103	6	7	**116**
Gaza Strip	**346**	**28**	**187**	**561**
Gaza	151	13	46	**210**
North Gaza	60	5	35	**100**
Khan Yunis	64	5	33	**102**
Rafah	34	1	35	**70**
Middle Area –Deir al Balah	37	4	38	**79**

Source: MOHE, 2006

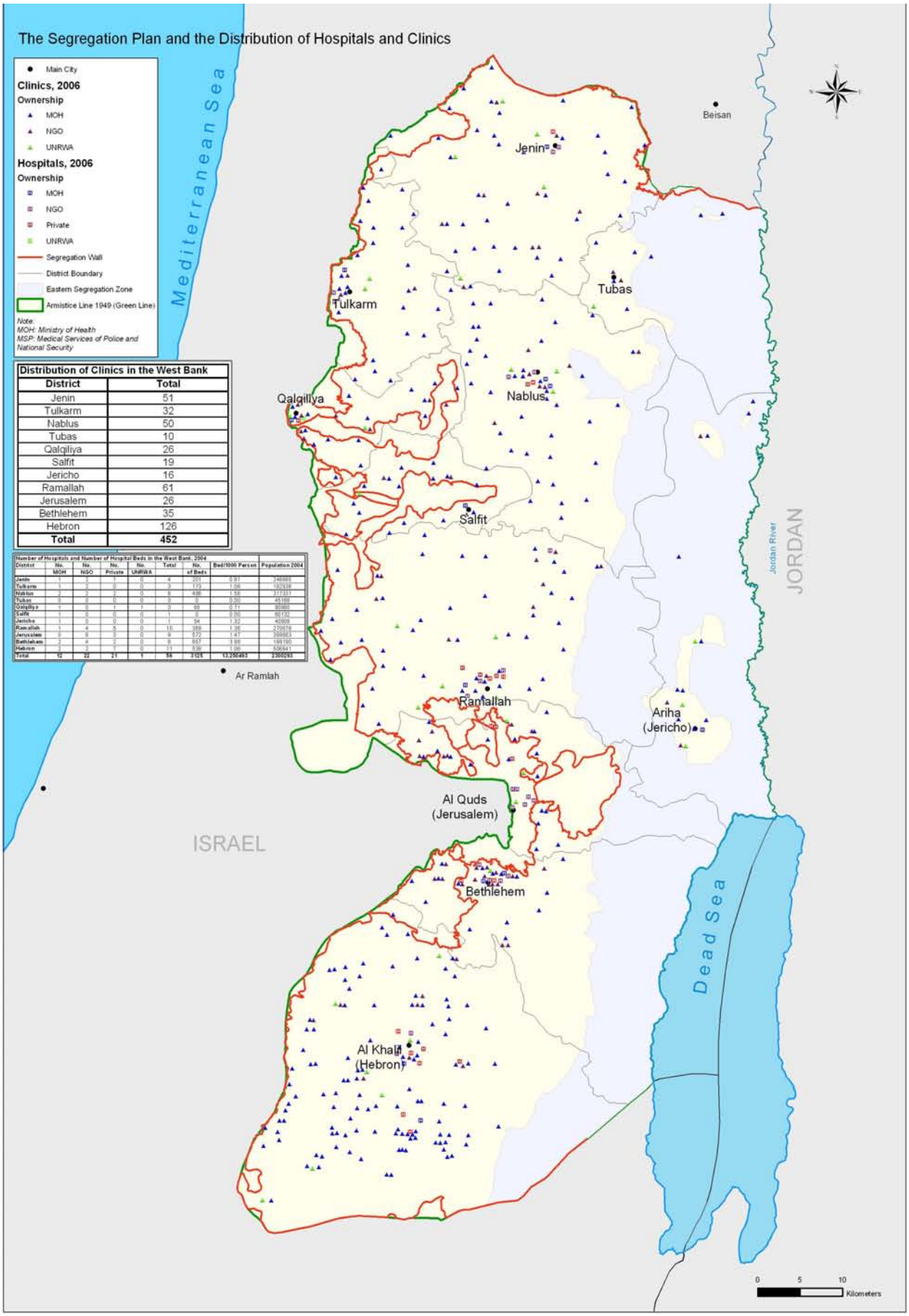
These schools provide educational services to about 1,067,500 students. In addition, there are 90 vocational schools, providing services for about 6,000 students. The average students/teacher and students/classroom in private schools is lower than that in governmental or UNRWA schools. The students/teacher is 21.3, 29.6, and 14.1 in governmental, UNRWA, and private schools, respectively, while the students/classroom ratio is 35.5, 39.3, and 23.2 in governmental, UNRWA and private schools, respectively. This indicates that the classes are relatively crowded with not enough teachers to meet a good standard in education.

Beside the schools, there are eleven universities, hosting about 132,791 students for the academic year 2005/2006 in the OPT. In addition, there were 13 university colleges and 19 community colleges. The total number of students who graduated from the Palestinian universities was 12,767 for Bachelor degrees, and 880 students for higher education as in the academic year 2004/2005. (MOHE, 2006).

3.3.4 Health

3.3.4.1 Health services

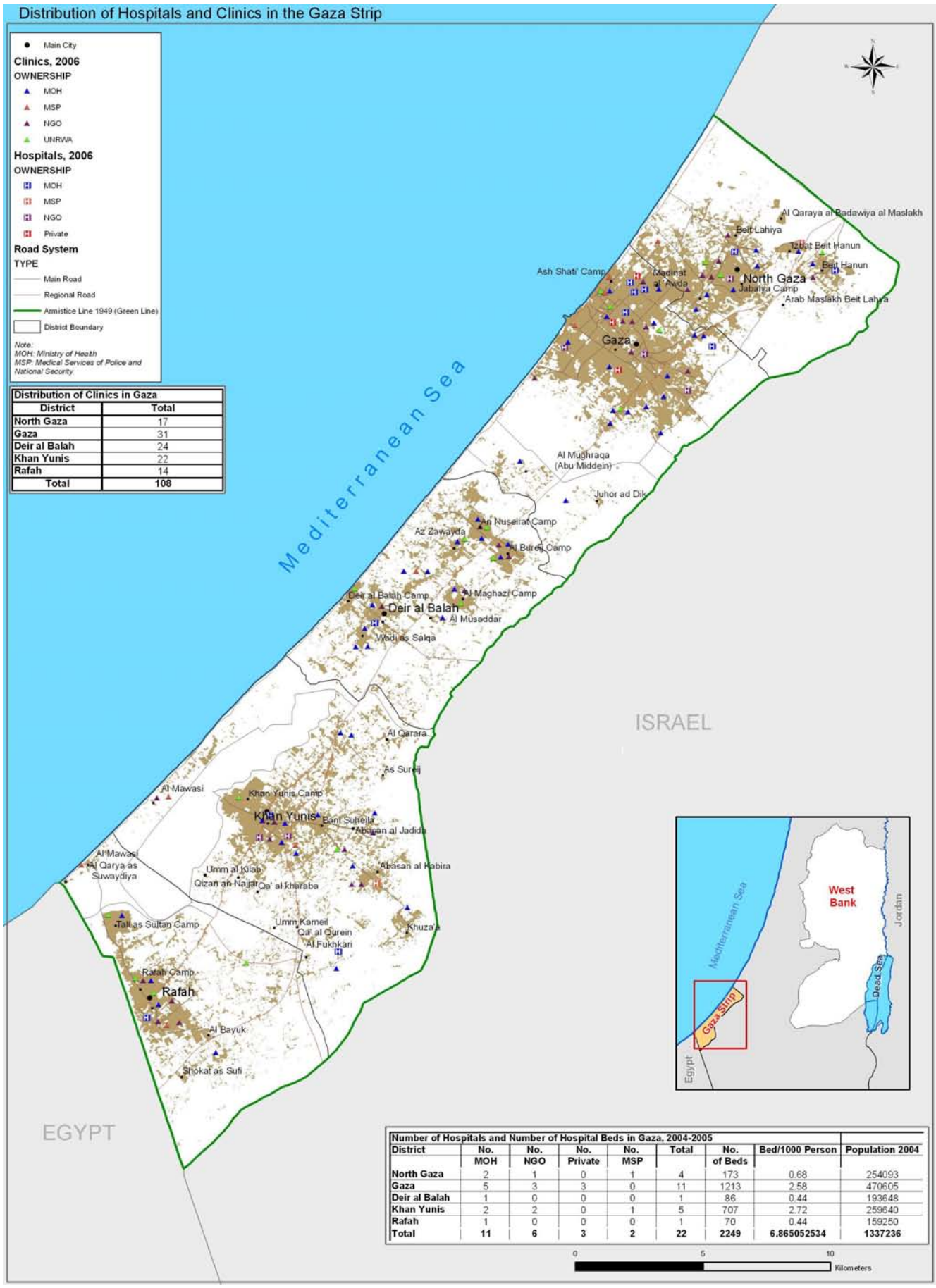
Since the PNA took control over the OPT in 1994, it took responsibility for the supervision, regulation, licensing, and control of the whole health service sector. Health services are provided mainly by the Palestinian Ministry of Health (MOH), the private sector, non-governmental organizations (NGOs), and the UNRWA. People get their health services from primary health care (PHC) clinics and hospitals. There are 667 PHC clinics in the OPT; thereby the average ratio of persons per center is 5,752. In addition, there are 76 hospitals in the OPT (MOH, 2006) (Map 3.3 and Map 3.4). According to the Demography and Health Survey (PCBS, 2005), the percentage of the Palestinian population that had health insurance in 2004 was 76.1% (65.8% in the West Bank and 93.8% in the Gaza Strip).



Distribution of Clinics in the West Bank	
District	Total
Jenin	51
Tulkarm	32
Nablus	50
Tubas	10
Qalqiliya	26
Salfit	19
Jericho	16
Ramallah	61
Jerusalem	26
Bethlehem	35
Hebron	126
Total	**452**

Number of Hospitals and Number of Hospital Beds in the West Bank, 2004								
District	No. MOH	No. NGO	No. Private	No. UNRWA	Total	No. of Beds	Bed/1000 Person	Population 2004
Jenin	2	1	1	0	4	201	0.81	246885
Tulkarm	1	2	0	0	3	172	1.08	162936
Nablus	2	2	2	0	6	496	1.56	317331
Tubas	0	0	0	0	0	0	0.00	45189
Qalqiliya	1	0	1	1	3	69	0.71	96960
Salfit	1	0	0	0	1	9	0.06	82132
Jericho	1	0	0	0	1	54	1.32	40909
Ramallah	1	4	5	0	10	388	1.36	270016
Jerusalem	0	8	3	0	9	572	1.47	388863
Bethlehem	2	4	2	0	8	667	3.98	168190
Hebron	2	2	7	0	11	536	1.06	506941
Total	12	22	21	1	56	3125	13.250493	2300293

Map 3.3: Distribution of Hospitals and Clinics in the West Bank in 2007



Distribution of Clinics in Gaza	
District	Total
North Gaza	17
Gaza	31
Deir al Balah	24
Khan Yunis	22
Rafah	14
Total	108

Number of Hospitals and Number of Hospital Beds in Gaza, 2004-2005								
District	No. MOH	No. NGO	No. Private	No. MSP	Total	No. of Beds	Bed/1000 Person	Population 2004
North Gaza	2	1	0	1	4	173	0.68	254093
Gaza	5	3	3	0	11	1213	2.58	470605
Deir al Balah	1	0	0	0	1	86	0.44	193648
Khan Yunis	2	2	0	1	5	707	2.72	259640
Rafah	1	0	0	0	1	70	0.44	159250
Total	**11**	**6**	**3**	**2**	**22**	**2249**	**6.865052534**	**1337236**

Map 3.4: Distribution of Hospitals and Clinics in Gaza Strip in 2007

3.3.4.2 Common Infirmities

The health status assessment of any society is important to allocate the sources of infirmities, to guide to treatment, to contribute to health planning, and to evaluate the quality of health care. Diseases are the most common infirmities that afflict individuals and impair their normal functioning. Diseases can be classified into two general groups; communicable and non-communicable.

According to the MOH, the communicable disease mortality reached 1,045 deaths in 2005, with a rate of 27.8 per 100,000 people. The distribution of mortality by sex was 53.4% among males and 46.6% among females with a rate of 29.2 and 26.2 per 100,000 populations, respectively.

In general, the incidence rates of many infectious diseases in the OPT declined due to the Palestinian Health Authority's efforts in monitoring health service programs and in controlling illnesses and diseases in the OPT. Some communicable diseases can be prevented by the use of vaccines. The rate of immunization has been accelerating to cover around 95% for all vaccines. However, the most relevant strains of vaccine-preventable diseases include poliomyelitis, acute flaccid paralysis, measles, tuberculosis, tetanus, and mumps. Other communicable diseases that are under control include brucellosis, with a relative incidence of 3.3 per 100,000 people.

A number of bacteria and virus strains are of serious concern in the OPT. Viral aseptic meningitis is considered endemic, while meningococcal meningitis, bacterial meningitis, is the most potentially life-threatening disease in the OPT. Viral hepatitis (A, B and C) are of concern and are also endemic in the OPT.

The Acquired Immuno-Deficiency Syndrome (AIDS) in the OPT is relatively low when compared to other countries. The first case of AIDS to be reported in the OPT was in 1988, and since then the overall registered cases have numbered 61, of which 44 cases had acquired AIDS and 17 were HIV carriers (MOH, 2006).

Rather than communicable diseases, the much greater threat to health today is in the form of non-communicable diseases. In general, the MOH depends on mortality data for non-communicable diseases to assess the changes in the health status. In 2005, 3,800 deaths from cardiovascular diseases were reported with a rate of 101 per 100,000 people (MOH, 2006).

1,623 cancer cases in the West Bank and Gaza Strip were reported by the Cancer Registry Centers in Gaza City and Beit Jala. The incidence rate of cancer was 43.1 per 100,000 people. The ratio of cancer mortality among total deaths was 27.8 per 100,000 people (MOH, 2006).

The MOH reported around 6,130 injuries, resulting from accidents with a rate of 195.1 instances per 100,000 people, and 509 deaths, resulting from accidents with a rate of 14 instances per 100,000 people (MOH, 2006).

Regarding the mental health status in the OPT, mental disorders are increasing. High levels of violence due to military occupation, the threat of, or the witnessing so, loss of security and the arrest and detention of different Palestinian age groups, have all resulted in frequent traumatic events and stress disorders with an incidence rate of 44 per 100,000 people in the West Bank, and 71.3 per 100,000 people in the Gaza Strip (MOH, 2006). In General The social and psychological status in the OPT impact the public health, whereby the stress or any mental or physical tension brought about by the pressures of the daily life affect the health status. In addition, exposure to other biological or chemical agents such as microorganism infections, food and soil contaminations, water and air pollution, sewer overflow, solid and hazardous wastes, and radiation pollution are of concern for potential impact on the overall Palestinian health status.

3.3.4.3 Israeli Occupation impacts on the distribution of the Palestinian population and public health

The Palestinian people have been affected greatly by immigration outside the OPT's boundaries and internal migration among the Palestinian Governorates and localities. The eruption of the Second Intifada, the Israeli restrictions and closures to enter Jerusalem and the closures between the Palestinian Governorates and localities forced many Palestinians to leave their homes and migrate outside the OPT, or to move to other Palestinian Governorates or localities, in an attempt to find employment. However, it has been difficult to study immigration, due to the lack of comprehensive data, which is a result of the inability of the PNA to control the border crossings in the West Bank and the Gaza Strip.

Internally, according to PCBS data, the percentage of Palestinians who changed their place of residence during the period 2000-2004 was 3.3% of the total population, where most of them moved from rural areas to cities. The main reasons for the internal migration were the Israeli closures and restrictions, the construction of the Segregation Wall, as well as to search for another work opportunity.

Following the signing of the Oslo Agreement in 1994, about 200 thousand Palestinians were to return to the OPT; out of which, 165 thousand have national numbers while the remaining 43 thousand are returnees from Jordan with no possession of national numbers.

In April 2002, the Israeli Government decided to build the Segregation Wall in the West Bank. The effects of the Wall on the Palestinian people, in terms of migration, unemployment, loss of land and poverty, in addition to restrictions on movement and social relations, have become manifest. The Wall has led also to reduction access to services, such as emergency health. It has also negatively impacted the educational quality in the West Bank. The Wall has affected not only those Palestinians living directly on both sides of its bath, but also the socio-economic conditions of many other communities of the West Bank, at large.

When the construction of the Segregation Wall is complete, it will isolate behind it about 555 km^2 of Palestinian land. 59 Palestinian communities, which more than 90,000 inhabitants, will be isolated in the Western Segregation Zone; and 41 Palestinian communities, which more than 32,000 inhabitants, will be isolated in the Eastern Segregation Zone (ARIJ, 2006). As in 2006, and according to the PCBS, 159 localities with 654,000 inhabitants have been affected directly and indirectly by the Wall. Lands of 16.6% of the households, living in the isolated localities inside the Wall, have been totally confiscated. Additionally, the Wall has affected the education sector, whereby 4.0% of the individuals in the localities have been affected by the Wall and hence, left their education (ARIJ, 2006).

The overall conditions of health in the OPT have been heavily affected by the Israeli Occupation. Health services are mainly affected by infrastructure problems, such as sanitation and communication, curfews and closures, aggressions against health personnel, and attack against hospitals and health centers.

The number of Palestinian deaths and injuries as a result of the Israeli Occupation is a terrible tragedy. From the beginning of the Second Intifada (in September 2000) to 2005, 3,844 Palestinians had been killed and around 54,548 wounded. The majority of deaths and injuries were in the age range of 20-29 years, which comprised 45.5% and 32.8%, respectively, of the total deaths and injuries in the OPT. These numbers represent only those killed and wounded as a direct result of the Israeli military aggression, excluding the victims of closures and lack of access to healthcare, as such as victims of the deteriorating socio-economic conditions (MOH, 2006).

The construction of the Segregation Wall has also placed a heavy burden on the health status of the Palestinian population in the West Bank. According to a preliminary study conducted by the MOH around 425,000 people (20% of West Bank's population) will be negatively affected by the Wall. 65.1% of households living in the isolated localities inside the Wall are separated from the health services. The Wall has limited the movement of patients, medical crew, and ambulances. It has also restricted access to laboratories, hospitals and health centers. In addition, food insecurity status has increased, resulting in malnutrition, whereby around 30% and 45% of children under five years of age suffer from chronic malnutrition and moderate to mild anaemia, respectively (MOH, 2006).

3.4 Millennium Development Goals (MDG) indicators in OPT

The PNA and a United Nations country team, in cooperation with the MDG's steering committee, prepared the 2005-MDGs progress report to analyze and monitor the progress and trends along the MDG in the OPT. It is noticed that the Palestinian data are fluctuating between improvements and declines, as a result of the political situation and the Israeli Occupation practices and restrictions in the Palestinian localities, where the Occupation has large direct impacts on the developmental process.

3.5 Outlook

The conditions of the demography in the OPT have been discussed in this chapter. It indicated that the political situation has had a major influence on demographic and economic development in the OPT. Damages to the health and education sectors, resulting from the Israeli land confiscation and house demolitions, have been highly significant. Furthermore, Israeli control over huge parts of the OPT has limited integrated planning throughout the region. It has also limited the formulation and implementation of comprehensive developmental plans. In addition, the Israeli presence in the OPT has caused a high population density and overcrowded in the region. The following recommendations aim at maximizing the benefits for Palestinian

According to the MDG's findings, the following recommendations aim at maximizing the benefits for Palestinian communities:

1. Proper planning and defining of acceptable population growth rates must be examined in the light of the impacts on the environment, economic development, and sustainability of life within the OPT.
2. The planning process for urban development should take into consideration the exiting high population density in the refuges camps, and put plans for improving the refugee camps' conditions.
3. Job creation programs must be established to limit the external migration especially for young people. In addition, the job creation programs must be intensified in the rural areas to limit the internal migration from rural to urban areas.
4. Infrastructure and development plans, including the development of large numbers of job opportunities, should be encouraged.
5. Support for the development of the educational institutions, especially the medium and higher education, must be included. And the opportunity for Palestinians in the OPT to continue their education must be made available.
6. Community housing projects for the young couples and for the households with limited income to decrease the housing density should be intensified.
7. Public health structures and integrating fragmented health services should be strengthened to unify data reporting for a successive health and nutritional assessments.

8. Primary health care through developing information and data collection strategy should be improved. National surveillance to identify disease trends and their associated risk factors should be conducted. Updating immunization programs, enhancing the capacity for the control and treatment of diseases, and developing psychosocial infirmities are necessities.
9. Health education and information should be promoted.

Chapter Four

Economy

4

4.1 Introduction

The Palestinian economy has been intensely affected by the Palestinian-Israeli conflicts. Since 1967, the Israeli Occupation has succeeded in turning the West Bank and the Gaza Strip into a dependent economy and reservoir of cheap labour. Following the 1993 Oslo Accords, the economic situation in the West Bank and the Gaza Strip continues to experience inherent instability. The decline in household incomes, the sharp increase in unemployment, and the general spread of poverty all pose serious challenges to achieving economic sustainability. In addition, the outbreak of the Second Intifada in 2000, brought with it severe economic and social consequences upon the Palestinian population in the West Bank and the Gaza Strip. The intensification of closures and the resultant restrictions placed on the movement of people and goods (not just within the OPT but between the West Bank, the Gaza Strip and Israel), have had the double-edged effect on both local economies and the export of Palestinian goods to the world. Israeli military and economic aggression against the Palestinians continued, and losses as a direct result of Israeli closures, are estimated at hundreds of millions of dollars (PCBS, 2000-2006).

The Palestinian economy lacks autonomy, national strategic control and a self-monitoring system. This is due to the fact that the Israelis' control the economy either directly or indirectly and it has never been under full Palestinian control. The status of the Palestinian economy in the West Bank and the Gaza Strip is clearly characteristic of underdeveloped countries. The agricultural, services and public sectors constitute the main components of the Gross Domestic Product (GDP).

4.2 Closures Impacts on OPT's Economy

World Bank estimates, as to the extent of closure impact on the Palestinian economy, cite a figure of US$ 5.4 billion, up to the end of 2002 (not including the physical damage to infrastructure and property). Gross National Income (GNI) declined from US$ 5.3 billion in 2000 to US$ 4.6 billion in 2002 (MAS, Third Quarter, 2005). This drastic decline is mainly due to losses in domestic production, and due to the restrictions imposed by the Israeli Occupation Forces (IOF) on the movement of the Palestinian people working inside Israel. In as such, the unemployment rate increased to 44.7% in the second quarter of 2002 (PCBS, Second Quarter /2002).

The impact on the (GDP) has been declining since its four- year high (1997-2000) of 4,637 million $ to 4,169 million $ in 2002 (MAS, Third Quarter, 2005). A World Bank report on trade in the year 2002 registered a record low for Palestinian exports, which decreased by 24% to a total of 260 million $. Imports also have decreased by 16%.

4.3 International Assistance

Donor assistance to the Palestinian people has had a critical role in supporting the development of the OPT, and in sustaining basic humanitarian and emergency support services. This financial assistance continued to form the main source of finance for investment expenditure (development) by the Palestinian National Authority (PNA). Total donor assistance disbursed to the NPA rose by 1.9% reaching to 417 million $ in 1999, after a drop of 20% in 1998. The infrastructure (energy, water, sewage and transportation sectors) remained the top priority for investment expenditures and accounted for 40% of the total donor assistance in 1999.

Total international financial assistance to the Palestinian people during the period 1994-2005 reached 8 billion $. The period of providing international assistance to the Palestinian people in OPT, my be divided in to Four periods. The level of the assistance and its distribution on the sectors is deferent

according to the characteristics of each period. These periods are:

The first period: 1994 -1997.
The second period: 1998 - 2000.
The third period: 2001- 2005.
The fourth period: 2006 - 2007.

The third period (2001-2005) witnessed a high level of international assistance which reached 4.5 billion $, against 2 billion $ and 1.5 billion $ throughout the first and second periods, respectively.

From the outset of the Second Intifada in 2000, the PNA relied heavily on external financial assistance to maintain certain fundamental elements of its development programs, and to address emergency needs and budget support. However, the share of development assistance dropped from 88% of total international aid prior to 2000 to just 28% in the period between 2001 and 2004 (see Table 4.1).

Table 4.1: Donor Support to the Palestinian National Authority by major category (million $)

Category	1999-2000			2001-2004		
	Total	Annual Average	Share in Total (%)	Total	Annual Average	Share in Total (%)
Development	930.5	465.2	88.1	1,163.2	290.8	28.4
Emergency	99.0	49.5	9.4	1,186.0	296.5	29.0
Budget Support	27.2	13.6	2.6	1,742.1	435.5	42.6
Total Support	1,056.6	528	100	4,091.2	1,022.8	100

Data in the Table includes support to UNRWA
Source: UNCTAD, 2006

The social sectors and building institutions have the main portion of assistance, these sectors have 60% of the total assistants (4.3 billion $), whereas disbursed on the infrastructure about 1.5 billion $ constitute 22 % of the total assistants. The share of productive sectors was less than 9% of the total assistants.

The fourth period, starting from 2006, Hamas has won the parliamentary elections in Palestine Israel and donors have considered a variety of economic responses. Israel has suspended the regular transfer of revenues to the PNA, and donors have reduced various categories of foreign assistance. The U.S. Administration has suspended its direct and indirect foreign assistance program in the West Bank and the Gaza Strip.

According to the Ministry of Finance (MOF) the total international aid to the Palestinian people in the OPT, received during the 2006, was 721.7 million $, of which 30.2% came from the European Union, 29.8% from League of Arab States, 9.5% from Arab people, 7.2% from Saudi Arabia, 6% from World Bank, 4.8% from Algeria, and the rest came from other countries. (http://www.mof.gov.ps/).

4.4 National Accounts

The Palestinian economy was destabilized beginning with the first Intifada after 1988 and the Gulf War in 1990-91. GDP has continued to fall through the peace process. Following the Second Intifada, the main indicators of national accounts declined sharply and the GNP of the OPT was set back by 5.4%. The decline in Palestinian economic activities covers all macro economic indices, resulting from the Israeli restrictive measures against the Palestinian people and economy. Despite positive growth rates during 2003-2005, Palestinian incomes remain considerably lower than their pre Intifada levels, with real GDP per capita in 2005 about 31% lower than in 1999.

A continuous decline in Palestinian economic activities from 2000 to 2005 in all macro-economic indices has resulted from the Israeli restrictive measures against the Palestinian people and economy. Reflecting on the past years, the following periods were discernable for real GDP:

(1) October 2000 through 2002: A period of severe crises, in which real GDP per capita declined by 36%.
(2) 2003 through 2005: A period of stabilization and gradual recovery, in which real GDP growth averaged about 7% per annum (World Bank). The World Bank estimated that the real GDP growth in the West Bank and Gaza Strip reached 8-9% in 2005.

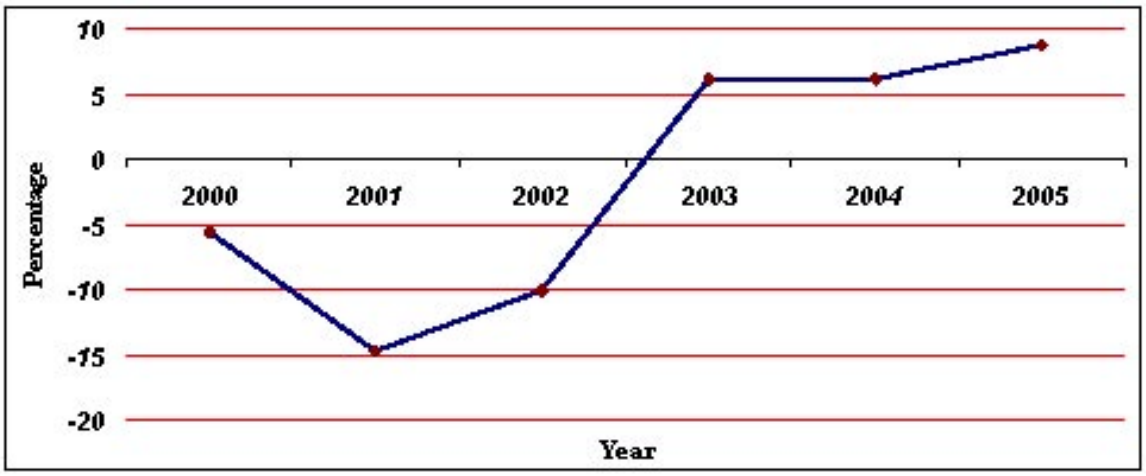


Figure 4.1: Real GDP growth percentage in the Palestinian Territory 2000 – 2005 (Source: World Bank, 2005)

A number of factors have fuelled economic growth in 2005, notably the lax Fiscal Policy, rapid expansion of commercial bank credit, strong growth in Israel, improved remittance from workers in Israel, increased Israeli demand for Palestinian exports, continued demand in the construction sector and increased donor assistance. Inflation is expected to remain low at around 3 percent.

The GDP of the second quarter of the year 2003 at constant prices was expected to grow by 4% in comparison with the first quarter of the same year. In 2004, the GDP was expected to grow by 8.7% during the second quarter of the year. For the third and fourth quarters of the year 2004, GDP grew by 4% and 2% respectively. In the beginning of 2005, the GDP increased by 0.6% during the second quarter of 2005 compared to the first quarter. The services sector contributed the biggest share, with 34.8%. For the fourth quarter 2005, the GDP decreased by 0.2% compared to third quarter in the same year. The total GDP, reach to 1,149.5 billion $ in the fourth quarter 2005.

The Palestinian economy since the outcome of the Palestinian Legislative Council elections of January 25, 2006, has faced a variety of economic restrictions. The Israeli authority has suspended the regular transfer of revenues, which it collects on behalf of the Palestinian National Authority (PNA) and accounts for over 60% of its revenues (WB, 2007). Other forms of economic interaction are Palestinian labor access to Israel and the flow of imports and exports across Palestinian borders with Israel, and donor planning to reduce various categories of foreign assistance. According to World Bank report, the impact of the suspension of clearance revenue transfers and restrictions on movement and access would be much greater than the impact of reduced aid flows.

In the first quarter of the 2006, the estimates at constant price of GDP decreased by 7.2% in Remaining West Bank and Gaza Strip (RWBGS). The second quarter of 2006 shows a continuous decrease by 1.7% in the performance of the economy compared with the first quarter of 2006. The loss of PNA revenues

was responsible for 9% cumulative real decline in GDP, in Quarter three-2006 relative to Quarter four-2005. This sharp decline was largely due to the Israel impounding of PNA Value Added Tax (VAT) and customs unions (UNRWA, 2006).

The data of third quarter of 2006 indicated the continuous decrease in the performance of the economy in the RWBGS. The third quarter shows a continuous decrease by 8.9% compared with the second quarter of the same year.

In the fourth quarter of 2006, the preliminary estimates at constant prices showed continuous decrease in the performance of the economy in Remaining West Bank and Gaza Strip. The GDP declined by 11.6% compared with the third quarter of 2006, and declined by 21.2% compared to the fourth quarter of the year 2005, at constant prices (Table 4.2).

Table 4.2: GDP in Remaining West Bank and Gaza Strip by economic activity and quarter for the years 2005, 2006 at constant prices (Value in millions US$).

Economic Activity	2005				2006			
	Q1	**Q11**	**Q111**	**Q1V**	**Q1**	**Q11**	**Q111**	**QIV**
Agriculture and fishing	65.1	86.1	84.4	77	71.1	89.1	80.9	92.9
Mining, manufacturing, elect. and water	144.7	142.1	143.9	134.1	119.3	134.6	144.2	133
Construction	24.3	33.5	32.9	28.7	27.5	27.2	24.7	24.6
Wholesale and retail trade	83.2	94.4	102.2	94.1	92.3	93.9	102.8	93.7
Transport, storage and communications	117.4	115.1	113.9	115.1	121.7	114.5	115.8	114
Financial intermediation	41.9	45.3	49.1	51.1	46.9	46.2	46.8	46.8
Other services	265.8	263.1	284.4	286.9	2915	296.4	254.4	209.7
Public administration and defence	177.6	178.6	208.7	231.2	220.9	202.4	184.1	130
Households with employed persons	2.2	2.1	2.2	2	2.2	2.2	2.1	2.1
Less: FISIM	-33.1	-34.7	-35.9	-36	-34.4	-34	-34.7	-35.3
Plus: Customs duties	65.4	65.5	76.2	84.8	59.2	44.8	39.8	39.8
Plus: VAT on imports, net	90.6	73.9	98	117.3	93.4	85.9	66.8	57
Gross Domestic Product	**1,045.1**	**1,065**	**1,160**	**1,186.3**	**1,092.5**	**1,077.9**	**982.3**	**908.3**

Source: PCBS, National Accounts, Q4/2006

The contribution of economic activities to GDP indicates that the services sector provided the highest contribution to the GDP, closely followed by industry. On other hand financial intermediation registered the lowest contribution to the GDP.

Table 4.3: Percentage Contribution to GDP by economic Activity in West Bank and Gaza Strip 2000 – 2005

Economic Activity	**2000**	**2005**	**Change**
Agriculture and fishing	12.3	7.0	-5.3
Industry	21.3	12.7	-8.6
Construction	10.5	2.7	-7.8
Wholesale and retail trade	17.3	8.4	-8.9
Transport, storage and communications	4.5	10.4	5.9
Financial intermediation	1.0	4.2	3.2
Other services	22.8	24.7	1.9
Public administration and defence	10.0	17.9	7.9
Households with employed persons	0.2	0.2	0
Others	0.1	11.8	11.7
Total	**100**	**100**	**-**

Source: PCBS Data (2000,2005)

4.5 Public Debit

The Palestinian public debt, mostly small loans given to the PNA to meet its financial needs during adverse conditions, remained largely under control. However, during the years of the Second Intifada the debt has increased dramatically. It is increased from 120 million $ in 2000 to 1257 million $ in 2004 (an average 37.2 % per year). Most of these loans grant to PNA by easy conditions from international and regional institutions such as Al Aqsa Fund (34.3%), World Bank (26%), European Investment Bank (12.6%) and Spanish Government (9.9%).

The Palestinian public debt crisis is further heightened by infrastructural as well as environmental destruction as a direct result of the Israeli Occupation. Construction of the Segregation Wall with the resultant house demolitions and destruction of agricultural land and crops, as well as the unquantifiable costs associated with widespread environmental damage, equate to a huge cost, as does the continued Israeli military presence along with its policy of siege, and wanton destruction. For example recent events in Ramallah that took place in last years; including the destruction of parked cars by an Israeli bulldozes testify to this belligerent tactic of attrition and intentional infrastructural damage.

4.6 Labor Force

The Palestinian Labour Force (PLF) is characterized by a high participation rate. In 2006, it stood at 41.3% with a total population of 3,888,000, and a 40.7% of a 3,762,000 total population in 2005. The males' participation rate in the total PLF decreased to 67.7% in 2006 compared to 70.1% in 2000. The females' participation rate increased from 12.7% in 2000 to 13.5% in 2006. In the first quarter of 2007, the participants in PLF decreased by 4.2% compared with fourth quarter 2006, where it decreased from 43% in the fourth quarter 2006 to 41.2% in the first quarter 2007. Also the participation of women decreased from 17.5% in the fourth quarter 2006 to 15.2% in the first quarter 2007.

The distribution of the participation in the PLF by region revealed that the West Bank has 44.1% in 2006, with 69.8% for males and 17.9% for females. The participation rate in the Gaza Strip reached 36.1%, with 63.7% for males and 8.1% for females, which is lower than the West Bank rates.

The PLF can be divided into three categories: full employment, underemployment and unemployment. The distribution among the three depends on the political situation and the Israeli procedures against Palestinians.

Since the outbreak of the Second Intifada in September 2000, PLF's surveys indicated that the fluctuations of the Palestinian economy are due to an unstable political situation and the strict closures imposed on the Palestinian areas, where the impacts of these conditions on the PLF has clearly reflected negatively on the different labour force components since September 2000.

The employment reached a rate of 76.4% in 2006, whereas 7.9% underemployed and 68.5% full employment. The result of the first quarter of 2007 shows a decrease in the number of employed persons compared with the fourth quarter 2006. The number of employed persons reached 698,000 in first quarter of 2007, compared with 718,000 in the fourth quarter of 2006.

The employed portion of the PLF force in OPT grew less rabidly (3.3%) than the labor force in general (3.8%) during 2005-2006 (Table 4.4), suggesting a growing number of unemployed during this period.

Table 4.4:Changes of employment in the Palestinian Territory, quarterly 2005- 2006			
Changes in employment	QIV-2005-QI-2006-	QI-2006-QII-2006-	QI/QII -2005-QI/QII-2006-
Total employment	-1.77 %	6.59 %	3.30 %
Men	-1.79 %	4.87 %	3.46 %
Women	-1.65 %	15.57 %	2.49 %
Source: UNRWA, 2006			

34.4% of the employed force is employed in the service sector, while 19.4% works in commerce, hotels and restaurants. The data also reveals that services are the main employment sector for females.

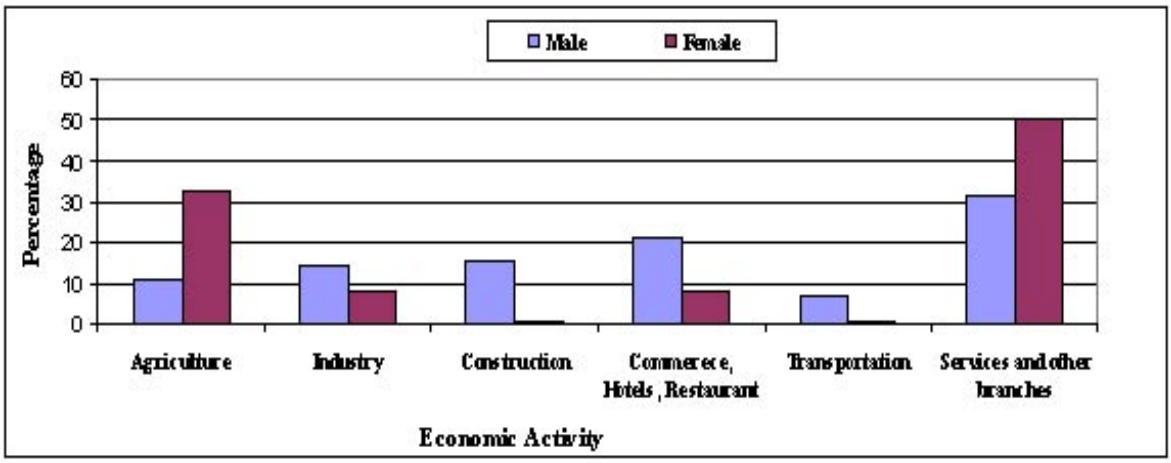


Figure 4.2: Percentage distribution of employed persons by sex and economic activity 2006

The unemployment rate increased sharply following the Second Intifada. In 2006, it increased to 23.6%, (24.2% of males and 20.5% of females experienced unemployment). The results showed that unemployment rate in the West Bank reach 18.6%, while it reached 34.8% in the Gaza strip. The Hebron Governorate had the highest unemployment rate in the West Bank, followed by the Jenin and Tulkarm Governorates, while the lowest unemployment rate was in the Jericho Governorate. Dier Al- Balah and North Gaza Governorates have the highest unemployment rates in the Gaza Strip.

Table 4.5: Percentage distribution of population aged 15 years and over in the OPT by Governorate and labour status (2005-2006)

	2005			2006		
Governorate	**Emplo-yment**	**Underemp-loyment**	**Unemplo-yment**	**Emplo-yment**	**Underem-ployment**	**Unempl-oyment**
Jenin	63.2	11.5	25.3	69.5	7.3	23.2
Tubas	69.6	10.3	20.1	70.1	10.4	19.5
Tulkarm	74.5	3.6	21.9	69.9	8.2	21.9
Nablus	72.7	9.2	18.1	70.3	12.1	17.6
Qalqiliya	54.9	24.2	20.9	56.4	27.1	16.5
Salfit	61.7	17.0	21.3	61.5	20.9	17.6
Ramallah & Al-Bireh	80.2	4.0	15.8	79.1	4.6	16.3
Jericho	84.2	2.6	13.2	81.9	3.7	14.4
Jerusalem	79.8	3.4	16.8	82.7	4.1	13.2
Bethlehem	80.0	6.5	13.5	77.9	8.4	13.7
Hebron	63.0	10.9	26.1	65	11.7	23.3
Total West Bank	**71.2**	**8.5**	**20.3**	**72**	**9.4**	**18.6**

Table 4.5 Continued

North Gaza	64.0	2.4	33.6	56.7	4.3	39
Gaza	69.8	3.4	26.8	61.2	5.5	33.3
Dier Al-Balah	62.6	2.3	35.1	61.2	3.8	35
Khanyunis	68.1	0.7	31.2	59.6	4.3	36.1
Rafah	69.7	1.3	29.0	66.1	3.7	30.2
Total Gaza Strip	**67.4**	**2.3**	**30.3**	**60.6**	**4.6**	**34.8**
Source: PCBS, Labour Force Survey reports 2005-2006						

The movement of the PLF between Israel and the OPT is the cornerstone of Palestinian economic dependency upon Israel. Palestinian dependence upon the Israeli labour market was mainly a consequence of the inability of the domestic economy to create enough jobs to absorb its growing labour force. Since 1991, Israel started to implement the closure policy, preventing Palestinian workers from reaching their workplaces beyond the Green Line.

In 2006, the Average daily wages in the West Bank is 77.9 NIS, Gaza Strip 68.9 NIS, whereas wages in Israel is 131.6 NIS. Therefore, the average daily wages in the West Bank were 24% higher than those in the Gaza Strip. Daily wages of workers in Israel were about 70% and 110% higher than the wages of those working in the West Bank or the Gaza Strip, respectively.

4.7 Economic Activities

The agricultural sector is of vital importance to the Palestinian economy, as the OPT is predominantly agricultural. Hence, many of its residents depend on agricultural activity for their livelihoods. However, the production levels of the agricultural sector have declined since the Israeli Occupation of the West Bank and the Gaza Strip in 1967. The decline of agricultural production (and, consequently, its contribution to the GDP), is due to the confiscation of land and limitation of water resources by Israeli authorities, restrictions imposed on the flow of agricultural products to Israel and Jordan, and the continual decrease in the number of agricultural service facilities.

Table 4.6: Main Indicators of Agriculture Sector in 1994 and Intifada Period

Indicators (Value in Million $; Area in dunum 1000)	**1993/ 1994**	**2000/ 2001**	**2001/ 2002**	**2002/ 2003**	**2003/ 2004**	**2004/ 2005**
Total cultivated area	1,827	1,815	1,815	1,815	1,823	1,833
Value of agriculture production	576.2	801.6	855.8	856.1	940.1	932.3
Cost of agriculture inputs	194.3	413.7	397.9	440.5	385.3	524.4
Gross value add	381.9	387.9	457.9	415.5	554.8	407.9
Participation in GDP (%)	12.3 (1994)	8.7 (2001)	9.9 (2002)	11.5 (2003)	11.4 (2004)	8.0 2005))
Participation in labor force	12.7 (1995)	11.7 (2001)	14.9 (2002)	15.7 (2003)	15.9 (2004)	14.6 (2005)
Source: PCBS (2006)						

In addition, the growing industrial sector represents a significant contribution to Palestinian GDP and is responsible for the employment of a large section of the PLF. The statistical data indicates that the industrial activities contributed to 12.7 % of the GDP (estimated national accounts 2005), and these activities employed 13.2 % of the total labour force in the OPT.

Table 4.7: Main indicators of industrial sector in 1994 and Intifada (2000 - 2005)							
Indicators (Value in Million $)	**1994**	**2000**	**2001***	**2002***	**2003***	**2004***	**2005***
No. of establishment	11,842	14,340	14,604	14,178	13,693	12,690	12,211
No. of employees	50,532	75,484	69,573	65,524	60,186	58,979	58,242
Compensation of employees	114.2	222.6	177.1	138.0	134.8	161.1	150.7
Output	888.9	1,576.9	1,270.4	976.9	1,058.4	1,459.8	1,475.2
Gross value add	353.4	656.4	459.3	364.1	477.6	652.5	605.8
Participation in GDP (%).	21.2	15.7	14.9	15.3	14.8	14.4	12.7
Participation in labour force	18 (1995)	14.3	13.9	12.9	12.5	12.7	13.0

** excluded Jerusalem*
Source: PCBS (2006)
**Industrial sector includes construction, mining, quarrying and manufacturing.*

The importance of the services sector in the Palestinian economy is reflected in the fact that it has been the largest contributor to the GDP and it employs the largest number of Palestinian workers. It made up 23.5% of the GDP in 1995 and 22.8% of the GDP in 2000. Its contribution in 2004 was estimated to be 24.7% of the GDP, compared with the 14.4% and 12.1% for industry and trade sectors, respectively, in the same year.

The number of establishments in the services sector amounted to 17,763 in 2004, employing 58,627 persons. The number of service establishments increased by 28 % from 1999 to 2004.The services sector also employed the largest percentage of the labour force in the OPT. The number of persons engaged in the services sector in 2005 was about 58,627 persons, which comprises 34.4 % of the total labour force in the OPT in 2005. The income of employees reached 16.8 million $ the same year. The value added of this sector reached 285.9 million $ in 2004.

Table 4.8: Main indicators of services sector in 1994 and Intifada (2000 - 2005)							
Indicators (Value in 1000 $)	**1994**	**2000**	**2001***	**2002***	**2003***	**2004***	**2005***
No. of establishment	9,637	14,144	12,223	12,978	11,925	17,763	16,422
No. of employees	33,721	49,556	43,427	44,399	41,164	58,627	55,423
Compensation of employees	108.6	159.9	107.9	113.6	131.8	167.5	178.3
Output	325.3	472.7	298.6	252.21	303.5	451.9	441.5
Gross Value add	199.3	314.1	195.3	176.1	214.1	285.9	296.4
Participation in GDP (%)	22.9	23.5	25.5	25.5	24.5	24.7	24.7
Participation in labour force	25.6 (1995)	29.9	34.6	35.7	32.8	34.9	34.4

**** excluded Jerusalem***
Source: PCBS (2006)

Internal trade activities in the OPT are generally characterized by relatively low turnover. They are usually family owned; most firms have only two workers. The participation of the internal trade sector in the OPT GDP has declined since 1994. Its participation decreased from 17.3% in 1994 to 11.7% in 2000 and fluctuated in the Intifada period, between 10.2 % in 2001 to 12.1% in 2004.

The result of the economic surveys series in 2004 showed that the internal trade sector constituted the largest percentage of all establishments in the economic sectors, where it contributes 61%.The number of employees in the internal trade sector also increased, from 62,496 persons in 1994 to 100,852 persons in 2004. This sector employed 44% of the total employees in the economic sectors represented in the economic surveys series.

The compensation of employees in internal trade sector increased from 58,631.4 $ in 1994 to 101,539 $ in 2000, and it decreased during the period of Intifada to 92,814 $ in 2004. The results of the economic survey series showed that the participation of this sector, in terms of all economic sectors employees' compensations, was 19%. Table 4.9 presents the main indictors of internal trade.

Table 4.9: Main indicators of internal trade sector in 1994 and Intifada (2000- 2005)

Indicators (Value in 1000 $)	1994	2000	2001*	2002*	2003*	2004*	2005*
No. of establishment	32,684	42,498	38,530	39,084	39,188	49,491	45,539
No. of employees	62,496	78,172	82,488	76,874	77,476	100,852	91,598
Compensation of employees	58.6	101.5	78.2	87.5	67.2	92.8	84.2
Output	596.3	687.5	524.6	517.5	597.9	740.8	716.8
Gross value add	464.0	527.2	348.8	364.5	421.1	531.5	525.1
Participation in GDP (%)	17.3	11.7	10.2	12	11.6	12.1	8.4
Participation in labour force	19.6 (1995)	17.5	19.7	20.0	20.1	19.4	19.4

**** excluded Jerusalem***
Source: PCBS (2006)

The Palestinian tourism sector is considered a cornerstone of the Palestinian economy. The existence of many tourist hotspots, predominantly in the West Bank, is a large contributing factor to Palestinian GDP.

The number of tourism establishments increased to 854 during the year 2000. This figure included tourist restaurants (139), hotels (108), travel and tourism agencies (148), and car rental companies (56), handicrafts and traditional goods factories (141) and souvenir shops (252).

Since the hotels are fundamental to tourism, they have increased in number from 72 in 1996 to 118 in 2000, and similarly, the number of rooms has increased from 2926 in 1996 to 4708 in 2000.
The number of establishments had declined from 854 in 2000 to 674 in 2002, and the ratio of decline has reached 21% of the number of establishments. In addition, many people lost their only source of income due to the fact that many of these establishments had to close down or cut down their staff. Table 4.10 shows the number and percentage of changes between 2000 and 2002.

Table 4.10: Main economic indicators by economic activity in Palestinian Territory 2000, 2002

Economic activity	No of Establishments			No. of persons engaged		
	2000	2002	Change%	2000	2002	Change%
Tourism restaurants	139	119	-14.6	1351	483	-64.3
Hotels	118	108	-8.6	1912	1010	-47.2
Travel & tourism agencies	148	125	-15.4	771	505	-34.6
Renting cars	56	42	-25.3	284	154	-45.8
Hand crafts and traditional goods factories	141	113	-19.9	517	216	-58.2
Souvenir shops	252	167	-33.7	543	233	-57.0
Total	**854**	**674**	**-21.1**	**5378**	**2601**	**-51.6**

Source: PCBS (2002)

The changes in hotel indicators during the second Intifada are explained in the Table (4.11).

Table 4.11: Main indicators for hotels activities in the OPT (2000 - 2005)

Indicator	2000	2001	2002	2003	2004	2005
No. of hotels	118	84	72	75	80	77
No. of rooms	4,708	2,860	3,098	3,050	3,554	3,648
No. beds	10,063	6,240	6,473	6,620	7,575	7,732
Average of rooms occupancy	1,481.7	303.2	302.3	371.6	429.5	564.0
Average of beds occupancy	2,785.9	506.5	464.8	546.0	772.4	959.5
No. of guests	335,711	60,208	51,357	62,812	100,184	131,908
No. of guest nights	1,016,683	184,857	169,641	199,275	268,695	350,219
Average length of stay	3.0	3.1	3.3	3.2	2.5	2.7

Source: PCBS (2000-2005)

4.8 Poverty in the OPT

The determinations of poverty in Palestine date back to the nineteenth century, where Palestine was continuously occupied by various super powers which lead the country to all kinds of poverty through the misuse of its natural and human resources.

Since 2000, land confiscation, destruction of farms, agricultural land and institutions, as well as imposing restrictions on the movement of people and goods between the West Bank and the Gaza Strip and between the OPT and Israel, have exacerbated regional poverty.

The National Commission for Poverty Alleviation in 1998 prepared the first comprehensive assessment of the level of poverty (Palestine Poverty Report 1998) in the OPT. The objectives of the report were to determine the degree and level of poverty and its locations in the OPT.

The report's overarching objective has been to increase our understanding of the causes of poverty, in order to find ways to reduce poverty among the Palestinian. Three broad messages emerged from the report, which are:

1. Unless the OPT are able to achieve high levels of economic growth, the prospects for future poverty reduction are not encouraging. Not only will the number of poor Palestinians grow rapidly, but their share in the population will also increase, which could become a socially destabilizing factor.
2. Unless Palestinians gain larger access to external markets and to better paying jobs, whether in Israel or in higher productivity areas in the OPT, it will be difficult for them to escape poverty.
3. The formal safety net does not have the financial resources necessary to have a significant impact on poverty. Nevertheless, it can play an important role in helping to reduce destitution among households headed by the unemployable poor and even the temporarily unemployed. (World Bank)

The rate of poverty (477 $ monthly) among Palestinian households in 2005 was 29.5%, (of which 22.3% in the West Bank and 43.7% in the Gaza Strip). In 2005, 51.5% of households were found to obtain an income less than the national poverty line, (of which 45.7% in the West Bank and 63.1% in the Gaza Strip). Refugee camps have the highest incidence of poverty overall. Reports indicate 53.9% of the poorest Palestinians amongst those who belong to households of 10 or more individuals. In contrast,

15.3% of "poor" Palestinians live as residents within households of 2-3 individuals. 6.8% of the households headed by woman are poor, although its poverty rate (25%) is lower than the households headed males (29.8%). The conditions of the poor households, whose heads are out of the labour force, were significantly worse than those in the labour force.

By main source of income, nearly 20.1% of households who depends on Israeli labour market as main source of income suffered from poverty in 2005, followed by households who depends on public (22.9%), compared with 50.4% who depends on agriculture and remittances and assistance as main source of income respectively, and 32.6% depended on the privet sector as a main source of income.

Table 4.12: Poverty rates according to monthly consumption patterns of households (1998 - 2005)

Indicator	1998	2001	2004	2005	% Changes between 1998 and 2005
Poverty rate	20.3	27.9	25.6	29.5	45.3
Deep poverty	12.0	19.5	16.4	18.1	50.8
Poverty gap	5.5	7.6	6.6	8.0	45.5
Poverty severity	3.0	5.0	3.9	4.4	46.7

Source: PCBS (2006)

The PCBS estimates poverty rates for the first two quarters of 2006, depending on the households' expenditure and consumption survey 2005. The poverty rate for the first quarter of 2006 was estimated at 29.4% and increased to 47.5% if income data were used.

4.9 Impact of the Segregation Wall on the Palestinian Economy

In August 2006, the PCBS conducted surveys of the surveillance system to monitor the impact of the Israeli measures on the well-being of the Palestinian people in OPT. The results of this survey indicated that the number of Governorates affected by the West Bank Segregation Wall increased from 6 in 2003 to 8 in 2006. The following are the main socio-economic results of the survey:

Movement

The percentage of individuals, whose movement has been restricted as a result of time-spent travelling, decreased in localities inside the Wall from 93.1% in October 2003 to 82.9% in August 2006. The percentage of individuals, who have had their movements restricted by the time schedule for passage, decreased from 89.6% in October 2003 to 81.2% in August 2006. The percentage of people, whose crossing requires special conditions (permission, ID cards) increased in the localities inside the Wall from 74.1% in October 2003, to 75.5% in August 2006.

Land Confiscation

16.6% of households, living in localities inside the Wall have had experienced complete land confiscation, as compared to 19.3% for households living in localities outside the Wall. 29.6% of households living inside the Wall have had part of their land confiscated as compared to 28.4% of households living in the localities outside the Wall. It should be noted that most confiscated lands in localities affected by the Wall were previously used for agriculture.

Humanitarian Aid

6.4% of households or of individuals in localities affected by the Wall reported that they received humanitarian assistance during July 2006 (7.2% inside the Wall and 6.3% outside of the Wall). The majority of assistance was provided in the form of food supplies, (23.9% was in cash).

Steadfastness Strategies

86.9% of households reported that they depend entirely on their monthly income; 83.0% of households reduced their monthly expenditure; 74.5% delayed payment of bills; and 53.9% of households borrowed money from others.

Income Sources

25.6% of the households living in the localities affected by the Wall depended on wages and salaries from Palestinian private sector as a main income source before the construction of the Wall, against 32.5% depending on this source after the construction of the Wall. In addition, before the construction of the Wall 38.9% of households living in localities affected by the Wall depended on wages and salaries from the Israeli labour market, compared with 21.7% depending on the same source following construction of the Wall. The results also show that 20.3% of households living in localities affected by the Wall depended on household projects before the construction of the Wall, against 21.8% depending on the same source after the Wall construction. 15.8% of households depended on wages and salaries from the PNA before the construction of the Wall, against 17.9% depending on the same source after the construction. 23.9% of households depended on the agricultural sector before the construction of the Wall, against 20.2% depended on the same source after construction.

Labour Market

32% of the labour force from localities affected by the Wall was unemployed, (23.4% inside the Wall and 32.3% outside the Wall). Most of the workers in the localities affected by the Wall received payment of some kind (69.5%), while the percentage of employers and self employed workers amounted to 24.7%. The results also revealed that 17.1% of the workers in localities affected by the Wall work in Israel and its settlements.

Priority Needs

47.4% of households in localities affected by the Wall reported the need for work as top priority for their localities. 23.4% of households reported the need for improving the infrastructure in their localities as top priority. 12% of households expressed the need for medical services in their localities. 7.2% of households expressed the need for security and stability.

Concerning needs of households, the results showed that 50.5% of the households in the localities affected by the Wall expressed the need for food as a top priority. 23.7% of households expressed the need for education. 9.8% of households expressed the need for medical treatment

4.10 Outlook

The economic conditions in the OPT have been discussed in this study. It is shown that the political situation has had a major impudence on economic development in the OPT. Damage to the health and education sectors, resulting from the Israeli land confiscation and house demolitions has been highly significant. Furthermore, Israeli control over huge parts of the OPT has limited integrated maximizing the benefits for Palestinian communities.

1. The Palestinian National Authority and the Palestinian people in the OPT should work for independent Palestinian economy and for ending the turning of the West Bank and the Gaza Strip into a reservoir of cheap labour and consumers for the Israeli products.
2. The people should reduce the dependency on Israeli products, and Palestinian products must be encouraged.
3. The Palestinian economy must be integrated in to the world market through liberalized trade, based on strengthening the existing customer union. In addition the Arab labour and goods markets must be opened in front of Palestinian workers and products.
4. Institutional buildings should be built and developed to take over responsibility of development and public investment and to increase the quality and scope of its services.
5. The role of private sector should be encouraged and increased, because it is the engine of the growth.
6. Because the Palestinian economy suffers from inadequate basic physical infrastructure, the Palestinian National Authority should investment in infrastructure (roads, water, electricity, telecommunications, etc) and should increases the investment in human resources, education and health, etc.
7. The Public and private sectors should cooperate to reduce unemployment in the OPT.
8. Since the international assistance to the Palestinian people has had a critical role in supporting the development of the OPT, the Palestinian people must impose their agenda and priorities to utilize this assistance.
9. Effective fiscal policies for increasing public revenues should be built, and a void get-out of tax payment which increased during the second Intifada.
10. The industrial sector and zone including construction, mining, quarrying and manufacturing should be encouraged. The implementation of new strategies for modernization of the industrial sector is highly required.
11. Economic activity must be directed towards a strict pattern of consumption, and towards the production of sufficient quantities of food products.
12. Incentives to savings and investment in the local economy and production must be provided.

Chapter Five

Agriculture

5

5.1. Agriculture

The Palestinian agricultural sector enjoys diversity in climatic conditions, number of planted crops, potential for increasing irrigated lands, and suitability to adopt modern production and post-harvest treatment technologies, which give agriculture the potential for improvement and development. The potential exists, therefore, to increase self-sufficiency and to generate more money from exportation, especially when the detrimental practices of the Israeli Occupation Forces (IOF) are ceased.

In the past seven years, agriculture has proved to be the most appropriate sector for dealing with emergencies that erupt in light of the political situation. Unemployment, poverty, and lack of access to food, as a result of the Israeli Occupation practices, have emerged as priority problems that the Palestinian society must deal with.

5.1.1 Land resources and agricultural holdings (availability, accessibility and ownership)

The Palestinian agricultural sector is expected to a population of about 4 million people, providing both an economic and food resource to the Palestinian people in the Occupied Palestinian Territory (OPT).

According to the geopolitical classification of the Palestinian lands in the West Bank, 62.9% of the agricultural lands (arable lands, mixed holdings, permanent crops and plastic houses) are located in Area "C" (under full Israeli control), 18.8% in Area "B" and 18.3% in Area "A" (Palestinians have full and civil control over area, respectively) (Figure 5.1). Thus the Palestinian farmers have proper access to only 37.1% of their agricultural lands. *(ARIJ, 2006; PCBS, 2006)*.

In the Gaza Strip, despite the "full withdrawal" by Israel, and subsequent return to full Palestinian control, the IOF have announced a security belt around the border with a total area of 58 km^2, consuming 17% of the total area of the Gaza Strip. These areas are inaccessible to the Palestinians due to continual shelling by the IOF.

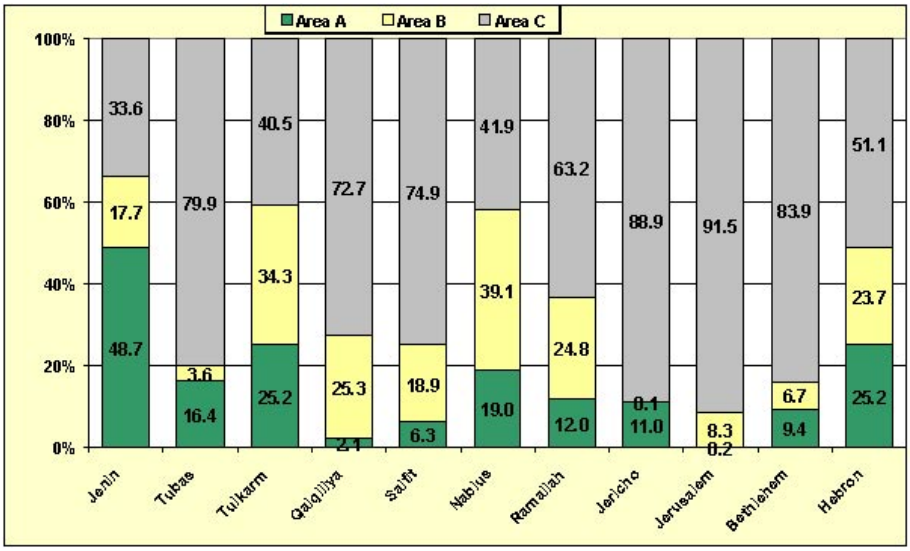


Figure 5.1: Distribution of agricultural areas- percentage in each geopolitical classification by Governorate

The agriculture practices in the Occupied Palestinian Territories (OPT) are divided into plant production (both rain-fed and irrigated) and livestock production. Agricultural holdings in the OPT are usually small (average size 18.6 dunums (0.0186 km^2)) household holdings. The majority of the agricultural holdings (88%) are owned by the household, but some are either fully rented, or owned land is supplemented by

renting an extra area. There are 101,172 holdings in the OPT, nearly 70% of which are plant production-only holdings, 7.6% are livestock-only holdings, and the remainder practice mixed production *(PCBS, 2005)*.

The OPT is only allowed to use 18% of the water extracted from the West Bank aquifers, the rest is taken by Israel. Irrigated agriculture in the West Bank, predominately in the Nablus and Jericho Governorates, uses 84.3 MCM/yr, although the actual water needs are estimated to be 81 MCM/yr. The extra water consumed is wasted as a result of poor irrigation practices, and of losses resulting from poorly maintained infrastructure. In order to make up the necessary quantity of water, the West Bank is obliged to purchase 1.5 MCM/yr of its own water back from the Israeli company Mekorot. The situation is similar in the Gaza Strip, where the calculated agricultural water demand is 82 MCM/yr, but the actual consumption is 89.5 MCM/yr, again relying on water purchased from Mekorot (3.05 MCM/yr) *(Al-Dadah and Mustapha, 2006; PCBS, 2005)*.

5.1.2 Agricultural Production

In the plant production sub-sector, rainfed agriculture forms the largest cultivated area in the OPT, which is 87.0% of the total cultivated land. However, the actual contribution of rain-fed agriculture to the total plant production varies according to the amount and distribution of precipitation during the growing season. In 2005, the rainfed agriculture formed only 23.5% of the total plant production, while protected irrigated agriculture covered only 2.3% of the total cultivated area, and yet contributed 47.4% to the total plant production. Open irrigation yielded the remaining 29.5% of production from the 10.9% of agricultural lands used in this manner *(PCBS, 2006)*. (Figure 5.2).

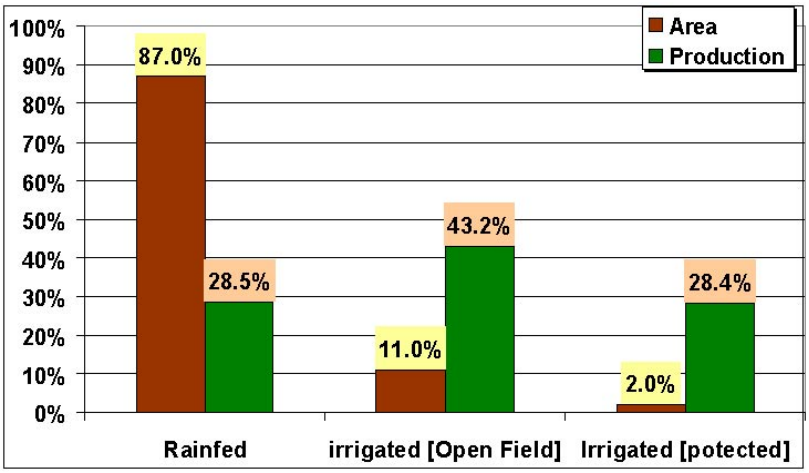


Figure 5.2: Distribution of plant production by planting system

The gross value of plant production in 2004/2005 was about 495 million $. A diverse crop types are planted in the OPT, but the most dominant groups are the fruit trees. The cultivated areas with Olive trees account for 81.4% of the fruit trees area, and produces between 5,000 and 180,000 tons annually, according to the bi-annual olive production cycle. Citrus fruits are the most important crop by economic value, although they cover only 2.4% of the area and produce approximately 70,000 tons/yr. Citrus are also very water intensive crops and the production is concentrated mainly in the Gaza Strip (*PCBS, 2006)*.

Currently up to 105 main crop types are cultivated, including 38 types of fruit tree (olives, almonds, other nuts, plums, apricots, peaches, pears, cherries, etc.) and 37 types of vegetable crops (snake cucumbers, cucumbers, tomatoes, onions, etc.) in addition to cut flowers and 30 types of field crops and grains (particularly wheat, barley, chickpeas, lentils, sorghum and vetch), which are cultivated according to rain fed and/or irrigation techniques. The OPT is rich in the local varieties (landraces) of plant crops which characterized in their production potential and they are acclimatized to the local climatic conditions.

Livestock holdings are also typically of small size, with over half of small ruminant (sheep and goats) holdings keeping a herd size between 1-19 heads, and 71% of cattle holdings having just 1-3 heads of cattle. Small ruminants are the most important type of livestock held in the OPT, in terms of the number of holdings and value of production. However, a large problem associated with the keeping of small ruminants is that the area and access to Palestinian rangelands, on which ruminants have historically grazed, has been significantly reduced by the activities of the Israeli Occupation. Of the 1,500,000 dunums of existing rangelands in the West Bank, 1,275,000 dunums (85%) are closed to Palestinians as a result of Israeli Settlements or Military areas and separation wall. Thus, 225,000 dunums remain as open rangeland for the grazing of ruminants (i.e. sheep and goats). The estimated carrying capacity of this area is 2,600 ruminants (ARIJ, 2004). There are currently between 150,000 and 200,000 ruminants in the area. This situation has existed for approximately 30 years. This places a heavy reliance on agricultural inputs, mainly the feed costs.

The poultry sector in the West Bank is larger than that of the Gaza Strip, but in the latter, the production has been suffering since March 2006, due to the discovery of avian flu, with 8 confirmed cases of infection in Gazan farms, which led to the culling of 400,000 farm birds (WFP, 2006). The bird flu issue is particularly important in the Gaza Strip considering the region's dependence on poultry as its main source of protein. Without it, Gaza would face serious economic and food security issues.

The bee-keeping sector, however, has shown itself to be highly feasible, mostly at a house-hold level, producing honey in a sustainable way due to its high local market price and the adaptability of the beehives to the local conditions.

The value of livestock production (white and red meats, dairy products, eggs, honey, etc.) in 2005 was 437.5 million $, compared with 342.3 million $ in 1999. This represents an increase in the value of livestock production between 1999 and 2004 by 16.4%. The contribution of the livestock sub-sectors to the total livestock production of the OPT in 2005 was as follows: 55.0% meat, 30.8% dairy products, 9.3% eggs, and 4.9% other products (e.g. honey, by-products, etc.) (PCBS, 2006).

Fishing occurs from the Gaza Strip with the average annual catch ranging between 1,507 tons in the year 2003 and 2,995 tons in 2004 compared with 2,900 tons of cached fishes in the year 1997. The value of production varies depending on the amount and the species caught. The total value of fish caught in 2004 was 7,029,000 $ (PCBS, 2005) the Gaza Governorate contributes 86.3% of total fish caught in that year. The catch is dominated by the sardine *Sardinella aurita*, although more than 20 other species are regularly caught. The fishery sector in the Gaza Strip is estimated to provide jobs to 3,500 people, with an unknown contribution to the informal employment market (OCHA, 2006). As of 2004 there were 725 registered fishing boats. For the period between the end of the previous ban on fishing (October 9th

2005) until the start of "Operation Summer Rains" (June 2006), fishing had been restricted by Israeli army to a narrow strip within 6 nautical miles from the coast. Generally, during 2006 there has been a complete ban on fishing from the Gaza Strip for more than 110 days (MoA, 2007). As a consequence the catch comprised mainly juveniles and breeding adults, resulting in non sustainable exploitation of fish stocks. Since the discovery of avian flu in the Gaza Strip, the pressure on the fishery sector has increased dramatically.

5.1.3 The Role of Agriculture in the Palestinian Economy

The agricultural sector is a vital sector in the Palestinian economy, as it has demonstrated to be one of the key sources of growth in the economic recovery that took place since 2003 (World Bank, 2006). The changes in agricultural activities are usually linked not only with climatologic conditions, but also with socio-political changes and conflicts. The Palestinian economy is highly susceptible to external shocks, political events, and the Israeli business cycle, including fluctuations in the Israeli agricultural productivity.

The contribution of the agricultural sector varies from one year to the next, based on the activity of other economic sectors and the accessibility of the Israeli job market to Palestinian workers. Despite the reduction in the contribution of the agricultural sector to the total Palestinian GDP in the period between 1997 and 2001, its contribution has gradually increased since 2002. The total contribution value between 1995 and 2004 varied from its lowest value in 2002 with 387.1 million $, to a maximum of 487.5 million $ in 2004 (Figure 5. 3) (PCBS, 2005).

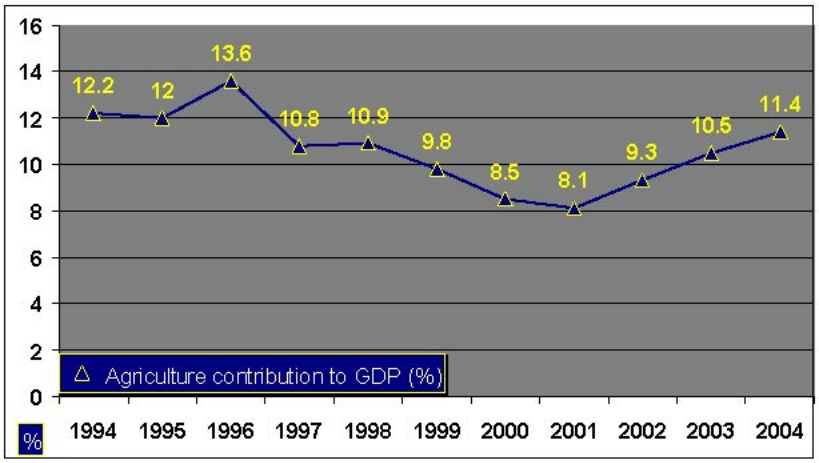


Figure 5.3: Agricultural sector's contribution to the total Palestinian GDP (1994 - 2004) (Source: PCBS, 2005)

Agricultural products account for 25% of the export trade from Palestine. Fruit (including strawberries and dates), olives and olive oil, vegetables and cut flowers are the primary export products. The shift to export-oriented agriculture increased the exploitation of cash crops and the dependency on imports of agricultural inputs used for intensive farming, as well as increased the dependency on Israel as it is an inevitable primary transit point part of all available marketing channels (WFP, 2006).

Israel is the main importer of the Palestinian agricultural products (around two-thirds of total), followed by the Arab Countries and the European Union (World Bank, 2006). Due to political conflicts, the value of agricultural

commodities exported to Israel and other countries fell from 97.3 million $ in the year 2000 to 21.1 million $ in 2003, with a negative balance of 76.2 million $. During this period, exports to Israel fell by 84.7%. This demonstrates the significant impact of export reduction on Palestinian economic strength and viability. The value of imported Israeli agricultural commodities was significantly lower in 2003 compared with 2000 – 159.1 million $ and 386.7 million $ respectively, thus representing a reduction of 58.9%, (PCBS 2005). Exportation and agribusiness strategies should support and empower small-scale farmers rather than focus primarily only on big farmers.

The agricultural sector is the third largest employer in the OPT, with 15.2% (117,300 people in 2005, of which 75.9% were in the West Bank and 24.1% in the Gaza Strip (MAS, 2006)) of the formal workforce, and up to 39% of the informal workforce employed in this sector. Many people, who have been unable to continue jobs in Israel, as a result of ever tightening restrictions, are absorbed by the agricultural sector. Due to recent political developments and the non-payment of the Palestinian Natural Authority (PNA) salaries since March 2006, many civil servants have gone back to agricultural work, in an attempt to alleviate loss of livelihood.

Regarding women involvement in the sector in 1996, women (15 years of age and older) constituted 14.5% of the formal labour force in the OPT, while in 2005 the female participation was 13.4%. The main role of women in the agricultural sector is in farming, processing and marketing of household agricultural produce (PCBS, 1996-2006). On the other hand, the agricultural sector constitutes the strongest foundation for developing the status and role of Palestinian women, as statistics indicate that almost 90% of the women in the informal economy work in the agriculture sector.

5.1.3.1 Contribution to food security and self-sufficiency

Agricultural activities in the OPT are characterized mainly as family (household) economic or subsistence farming for food production (Table 5.1). It is clear that at present the agriculture sector is more relevant at the national level, in terms of food security than as a direct income provider though revenues, as only around 20% of agricultural commodities are produced for direct sale, the rest go primarily towards domestic consumption.

Table 5.1: Use of agricultural products in the OPT

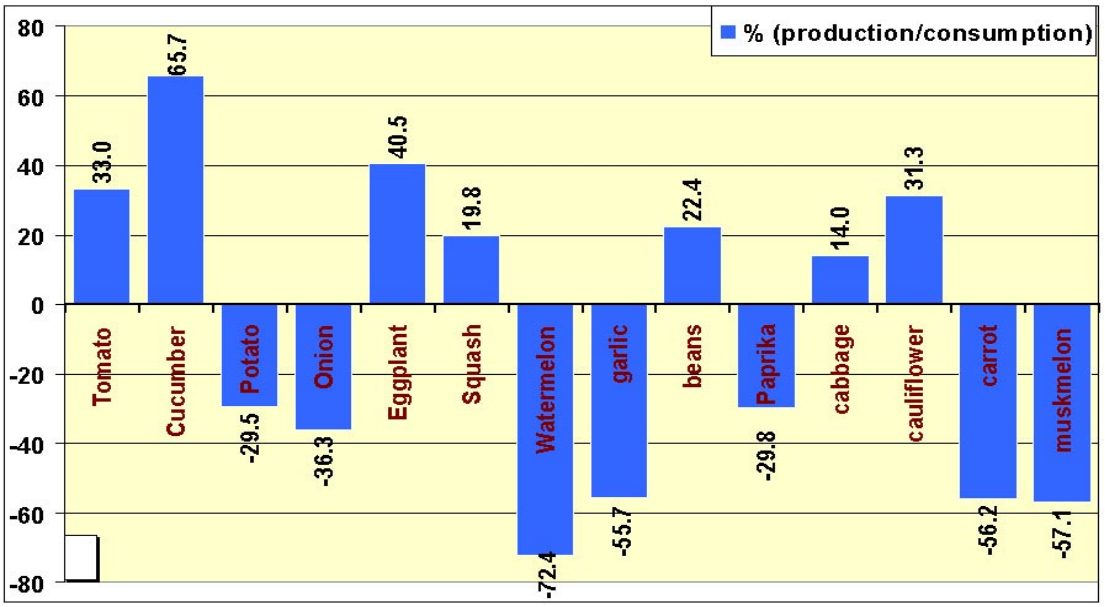
Use	Mixed/pure plant production	Livestock production
Domestic consumption	57.6%	45.6%
Surplus sold (after domestic consumption)	22.7%	34.7%
Direct sale	17.9%	22.7%
Other	1.9%	

A study conducted by the Ministry of Agriculture in the year 2005, concerning the production and consumption rate of agricultural commodities in Palestine showed that the agricultural sector is meeting the Palestinian populations' requirements for the main vegetables, such as tomatoes, cucumbers squashes, eggplants, beans, peppers, cabbages and cauliflowers, with production surpluses, which are usually exported to Israeli markets. However, the local production of potatoes, onions, watermelons, and garlic does not meet the Palestinians' consumption which creates food security gape (Figure5.4a).

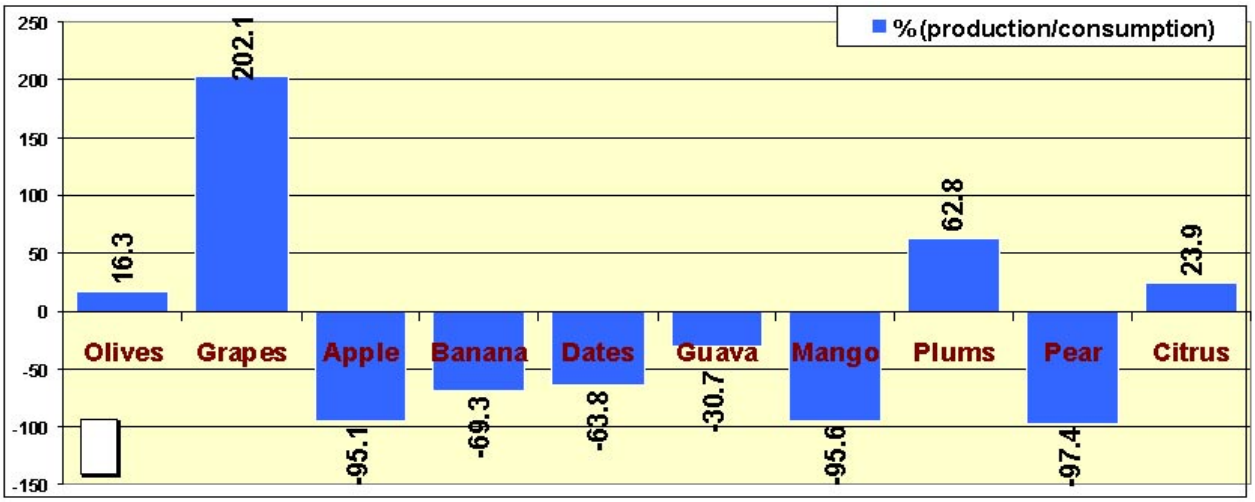
Regarding fruit production, there is a general inability to meet the local consumers' demand, yet the local production of olives, grapes and citrus has achieved self-sufficiency and there are surpluses, which are usually marketed to Israel and/or other countries (Figure 5. 4b).

The livestock production sub-sector in the OPT has been characterized by continuous growth in some types of animal production, which gives an opportunity to reduce the existing production-consumption gap in the majority of the main livestock commodities. Nevertheless, there are clear shortages in fish and honey production (Figure 5.4c).

a) Vegetables



b) Fruits



c) Livestock production

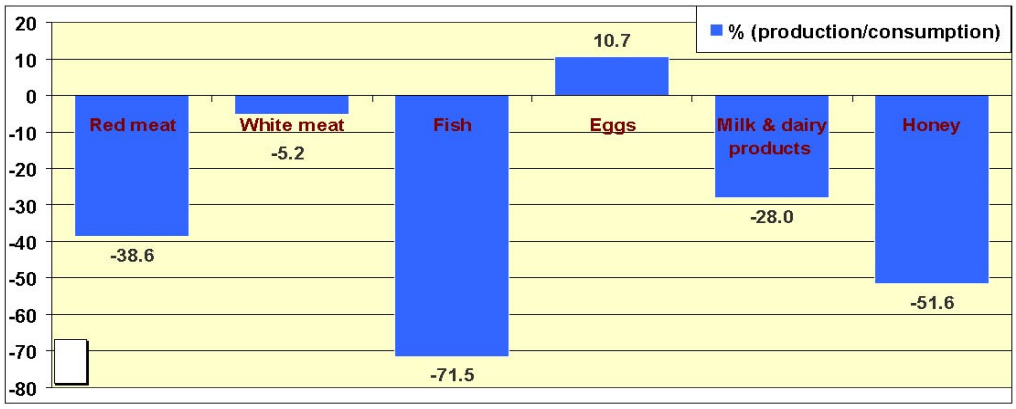


Figure 5.4: Production/consumption balance for the major agricultural commodities produced and consumed in the OPT (Source: Jebreen and Mouhammed, 2004).

5.1.3.2 Contribution to income and livelihood

Daily wages for formal agricultural workers usually vary based on the working area. The highest wages are paid to those who work in Israel (75.6 NIS (16.8 $/day)), followed by the West Bank (53.5 NIS (11.3 $/day)), and finally the Gaza Strip (33.4 NIS (7.4 $/day)). The workers in this sector usually work 18-21 days per month, depending on the working area, accessibility, and availability of the work. The current political conditions have affected the average daily wages in different territories. The daily wages during the period 2001 to 2005 were reduced by 10.3% in the West Bank; 3.5% in the Gaza Strip; and 1.3% in Israel, compared with the years 1999-2000. (PCBS, 1999-2006). Daily wages in the agricultural sector are generally lower than the average daily wages in all other economic sectors. Workers in other sectors can expect to earn 15.4 $ and 9.1 $ per day for the West Bank and the Gaza Strip, respectively (PCBS, 1999-2006).

Subsistence agriculture as coping strategy for food insecurity and unemployment

Based on the economic feasibility of constructed greenhouses study conducted by ARIJ in the southern part of the West Bank, which was funded by ACDI/VOCA/USDA, the average annual greenhouse crop production per dunum was 25.5 tons/dunum/year from different crops. The average monthly net profit was 646 $/ dunum/ month or 7,752 $/ dunum/year. As the average ARIJ greenhouse's size reached 0.44 dunum, annual net profit/ family/year is estimated by ARIJ calculations at 3,405 $ (ARIJ, 2005).

Additionally, irrigated home garden crop production calculations for 1 dunum of vegetables and fruit trees revealed that the average production is 730 kg/dunum/year. The home garden family income from 1 dunum is estimated at 417 $/ year/family.

A home poultry farm with 70 laying chickens can produce an average of 2100 eggs per month, with a total value of 840 NIS/month, and the net income after subtracting the feed costs is around 500 NIS per month.

A home Sheep and goat farm with ten heads of pregnant females can produce 2250 litter milk/ per year with a value of 11,250 NIS and 15 off-springs with total value of 9,000 NIS. The net profit after subtracting feed and vaccines costs reached to 12,400 NIS.

5.1.3.3 Institutional, infrastructure and resources of the agricultural sector

The Palestinian Ministry of Agriculture is the governmental body responsible for organisation and development of the agricultural sector. In 2005, the number of operational agricultural cooperatives and societies in the OPT was 204, compared with 109 in 1998 and 113 in 2001. 74% of the 204 existing agricultural Community Based Organizations (CBOs) are located in the West Bank and 26% are in the Gaza Strip (PCBS, 2005).

The agricultural CBOs are classified according to their activities. The most dominant types of the CBOs are agricultural services (forming 27%); followed by agricultural production (15.2%); livestock and poultry (14.7%); marketing (12.7%); olive pressing (7.4%); bee keeping (apiculture) (5.9%), and finally, lending and supply of inputs (4.9%).

According to the Agricultural Projects Information System (APIS) records, there are 70 organizations working in the agricultural sector in the OPT, of which 21 are foreign governmental organizations, 18 are international NGOs, 13 are multilateral agencies, 12 are Palestinian NGOs, and 6 are PNA's institutions (APIS, 2006).

There are two agricultural secondary schools in the OPT: one in the West bank and the other in the Gaza Strip. Additionally, there are four universities in the West Bank and the Gaza Strip providing BSc. degrees in agriculture. Furthermore, the National Agricultural Research Centre (NARC), which belongs to the Ministry of Agriculture is well equipped to conduct researches, experiments, and field trials in the field of agriculture (e.g. seed breeding programs). The number of registered agricultural engineers in the OPT amounted to 1,551, whereby 819 of which are in the Gaza Strip.

Up to 196 nurseries exist in the OPT, with 119 nurseries in the West Bank. Additionally, there are 11,404 tractors in the OPT (3.4% in the Gaza Strip), 5,039 ploughs (3.5% in the Gaza strip), 6,411 cultivators (1.1% in the Gaza Strip), 9,883 spike – tooth harrows (24.2% are in the Gaza Strip) and 7,859 (14.4% in the Gaza Strip) (PCBS, 2005).

On the other hand, several agricultural and rural organizations/cooperatives have established the Palestinian Rural Development Union (ARDI-Palestine). This union aims to improve the livelihood of rural Palestinian areas and to improve rural commodities, as well as to preserve their national identity through developing a "Palestinian Geographic Identification" for national rural commodities. ARIJ and the Economic and Social Development Center of Palestine (ESDC) are working with other partners MoA to register this Union under the supervision of the Palestinian MoA.

According to APIS, the Palestinian agricultural sector is assisted by funding in the form of grants and loans from a range of donors. Since the year 2000, approximately 138 million $ had been distributed to projects and organisations, working in the agricultural sector. The most significant donors are foreign government organisations, which contribute 64.4% of all funding, and the main recipient has been the Ministry of Agriculture, which has received 55% of all incoming funds. Funds are primarily directed towards land use and infrastructure projects. However, of all the funding expended and distributed by donors within the OPT, the agricultural sector receives an average of only 0.65% (according to the Palestinian Ministry of Planning (MOP) in 2004). Moreover, in the year 2006, the Ministry of Agriculture received only 0.9% of the total PNA's budget. In the last four years (2003-2006) the MOA received only 0.7-1% of the PNA's annual budget (Ministry of Finance, 2006)

5.1.4 Constraints facing the agricultural sector

The agricultural sector in the OPT faces a number of serious constraints, most of which are a direct result of the activities of the Israeli Occupation. The ongoing construction of the Israeli Segregation Wall and the increasing number of physical impediments to movement imposed by Israel, such as roadblocks and checkpoints, are all having dramatic effects on the ability of farmers to access their lands and markets. The cost of transporting goods to markets and of receiving agricultural inputs has increased, as a consequence of longer journey times. Produce destined for external markets frequently spoils, as it

is detained at checkpoints. In addition to the restrictions on movement, the Israeli Segregation Wall and the network of Israeli roads are effectively annexing important areas of agricultural land and agricultural water resources. The Occupation has also caused a huge financial loss to the sector, by demolishing all kinds of agricultural assets and infrastructures. Uprooting trees, destroying animal barracks, damaging agricultural wells, and slaughtering animals are all practices that continue to be employed by the Occupying Power (Israel). It is estimated that in the last six years (2001-2006), the direct and indirect costs to the agricultural sector, resulting from the Occupation practices, have been more than 1 billion $ *(Agricultural losses due to occupation practices, MOA, 2006)*.

Of particular note is the issue of the 4,000 dunums (4 km^2) of greenhouses, transferred to the Palestinian Authority after the Israeli withdrawal from the Gaza Strip, as an example of the export potential of the Palestinian agricultural sector. The potential for exports of high-quality agricultural produce is great, as was proved during the first agricultural season of 2006. On the other hand, sensitivity to Israeli closures has constituted a major constraint for marketing, with direct losses during the last season in the Gaza Strip, estimated at 600,000/$ day.

Other significant constraints are that the current agricultural production calendar is limited to only a few peak-harvest months each year, and that the varieties of crops and livestock-farmed are generally traditional breeds, with low yields and low competitiveness in international markets. The post-harvest (processing and transport infrastructure for Palestinian agricultural produce) is inadequate to keep up with production. Therefore, it is difficult to produce goods which can compete in external markets. As mentioned earlier, the water infrastructure and irrigation practices in some areas are inefficient, having the result of reducing the area that could potentially receive irrigation.

Plant production calendar in Tubas Governorate.

At present, the plant production calendar for the OPT is heavily biased towards producing commodities only in certain months. For example, in the Tubas District, there are 17 vegetable crops grown, in addition to olive trees. The 7 major vegetable crops are tomato (27.2%), cucumbers (25.8%), eggplants (15.5%), squashes (9.2%), potatoes (5.2%), beans (4.6%) and sweet corns (3.8%). Despite the variety of crop types, 86.8% of production occurs in 7 months of the year; between December and June (Figure 5.5). December is the month of highest production (17.8%), with the lowest monthly production, occurring in August (3.1%) (ARIJ and ACH, 2006). This leads to an unmatched demand and supply of agricultural products that can produce surpluses and can even decrease the prices of certain commodities due to their high availability at certain times of the year.

Figure 5.5: Monthly production of the main vegetable crops in Tubas Governorate

Recent developments in the year 2006, concerning the agricultural sector, include the election of the Hamas Government, which resulted in Israel's refusal to forward tax rebates collected from the OPT. In addition, the international community has decreased the level of funding for development projects in the OPT. Accordingly, the agricultural sector has severely suffered. Israel also increased the level of closures and checkpoints during the last seven years or so, and, hence, increased disruption of movement of goods and people. The military operation "Summer Rains" in the Gaza Strip has had significant impacts on the agricultural sector. Large areas of land were made inaccessible, due to the Israeli regular shelling. In addition, tight Israeli control has caused the complete collapse of the fishery sub-sector in the Gaza Strip. In terms of food security, the agricultural sector is generally struggling to meet with demand in all except in vegetables. This problem has been exacerbated by the discovery of avian flu in the Gaza Strip (in March 2006), which resulted in the culling of thousands of birds, and as a result, has severely reduced consumer confidence in poultry products.

At the social level, the agricultural sector has been very important in absorbing workers, who have been unable to retain jobs in Israel, due to movement and permit restrictions. In fact, during 2006, the agricultural sector moved from being the 5th to 3rd largest employment sector for the Palestinian people in the OPT. The agricultural sector has contributed to domestic incomes through both formal and informal markets, and has provided work to both women and young people (groups who often find themselves marginalised in the job markets).

5.2 Food Security

The food security status of the OPT has been negatively affected by the Palestinian population growth; the inception of the Second Intifada in September 2000; the severe Israeli closure policies on the movement of people and goods within and between the West Bank and the Gaza Strip, and into Israel; the isolation of markets; the widespread unemployment; the crisis of the Palestinian economy; and the stress on natural resources. An assessment conducted by WFP (United Nations' World Food Programme) in 2006 indicated that around 2 million Palestinians (49% of the OPT's population) are chronically food insecure, of which 56% in the Gaza Strip and 44% in the West Bank. Food insecurity mutates among districts and governorates of the OPT. Rafah Governorate comprises the largest percentage of food insecure population (83%), followed by North Gaza (73%), Jericho (64%), Khan Younis and Tulkarm (57%), and then Deir Al-Balah and Hebron (50%) (CAP, 2007).

An updated study was also done by the Ministry of Agriculture (MOA) and FAO, which provides a brief assessment of the food insecurity situation in the OPT, based on food consumption statistics derived from data collected in the 2005-Palestinian Consumption and Expenditures Survey (PCES) using the FAO methodology. The study shows that 44% of the population in the OPT was food deprived in 2005, as they were consuming less than the Minimum Dietary Energy Requirement (MDER) of 1680 kcal/person/day. Almost one half in rural areas or refugee camps was food deprived with a higher percentage than 40% in urban areas

Major causes of food insecurity in the OPT are due to unavailability, inaccessibility, and inadequate use of food. Food unavailability and inaccessibility are mainly due to the continued Israeli Occupation in all its manifestations, including restrictions on movements, curfews, closures, and the cantonization of the Palestinian land by imposing physical barriers such checkpoints, colonies and the Segregation Wall. The Segregation Wall aggravates the already restricted access to income-earning activities and food, and has removed large areas of the Palestinian agricultural lands from their rightful owners. In addition, the Occupation has had a damaging impact on the ability of the Palestinian National Authority (PNA) to properly implement its policies on a country-wide basis. The closure policies have also disrupted the

Palestinian Labour Force. Before the Second Intifada around 23% of employed Palestinians worked in Israel or, in Israeli settlements in the OPT. In 2001 the number dropped to 13.8% to reach 9.6% in 2006.

Following the 2006-Legislative Elections, the PNA has received no source of funding due to Israel withholding tax money, as well as due to US and EU cutting off fund aid. The new situation has caused further escalation in poverty, poor economy, and unemployment rate, which all have resulted in an economic recession, obliging the Palestinian households to redistribute their expenses' priorities and to develop coping mechanisms to deal with, and meet the shortage in their household income.

Another major impact on the food security in the OPT was the outbreak of the Avian Influenza in March/ April 2006. Many Palestinians depend on poultry as a coping mechanism instead of expensive red meat and fish. For example, the monthly average consumption of poultry meat in Tubas Governorate was 1.02 kg/capita and was considered the main source of protein intake in their diet when compared to 0.40 kg of red meat per capita and 0.34 kg fish meat per capita (ARIJ, ACH, 2006). However, the distress reaction against Avian Influenza outbreak and the poor awareness had resulted in a decrease in poultry consumption and, therefore, a decrease in animal protein intake.

It is worth mentioning that other factors have also affected the food insecurity in the Gaza Strip (not long since the interfactional clashes in January 2007 between Palestinian political parties), which restricted Palestinian movements and access to sufficient, safe and nutritious food to meet their dietary needs and food preferences.

The former socio-economic and political situation had resulted in a disrupted and inadequate biological food use. The dietary needs of Palestinian individuals are not met, because the general food consumption has decreased and, thus, the dietary intake has become inadequate. In addition, the coping mechanisms surrogated by Palestinian households have become inefficient, and useless.

The groups in the Palestinian society who are most vulnerable to food insecurity include lactating and pregnant women, poorly educated people, children and the elderly, poor-income sources' people, and those who were employed in Israel and are currently out of work due to the Israeli occupation measures. Some groups are also vulnerable to the risk of food insecurity, as a result of deterioration in economic situation. These include traders and small shop owners, small farmers, fishermen and Bedouin communities (FIVIMS, 2006). Since the 2006-Legislative Elections, a new vulnerable group of the PNA employees has been created, as they have not received their salaries since February 2006.

According to the 2005-Palestinian Consumption and Expenditures Survey (PCES), the national average dietary energy consumption was 1,890 kcal/person/day. The average daily dietary energy consumption of the 44% food deprived people was of 1,319 kcal/person, representing a food dietary energy consumption deficit of 361 kcal (1,680 – 1,319 kcal), compared to the MDER (Minimum Dietary Energy Requirement of 1680 kcal/person/day). The population of the lowest income group had an average dietary energy consumption of 1,220 kcal/person/day, which was 460 kcal less than the MDER. The national average daily consumption (grams per person) of carbohydrates, fats and proteins were 289, 60 and 58, respectively, with contributions to energy consumption of 59%, 29% and 12%, respectively (Figure 5.6). This is an acceptable food consumption pattern with share of fat to total energy near the upper limit of the recommended 30%. Cereals, oils and fats, prepared food, and, to a lesser extent, meats were the main food commodities consumed by the average Palestinians, contributing about 75% of the Dietary Energy Consumption (DEC).

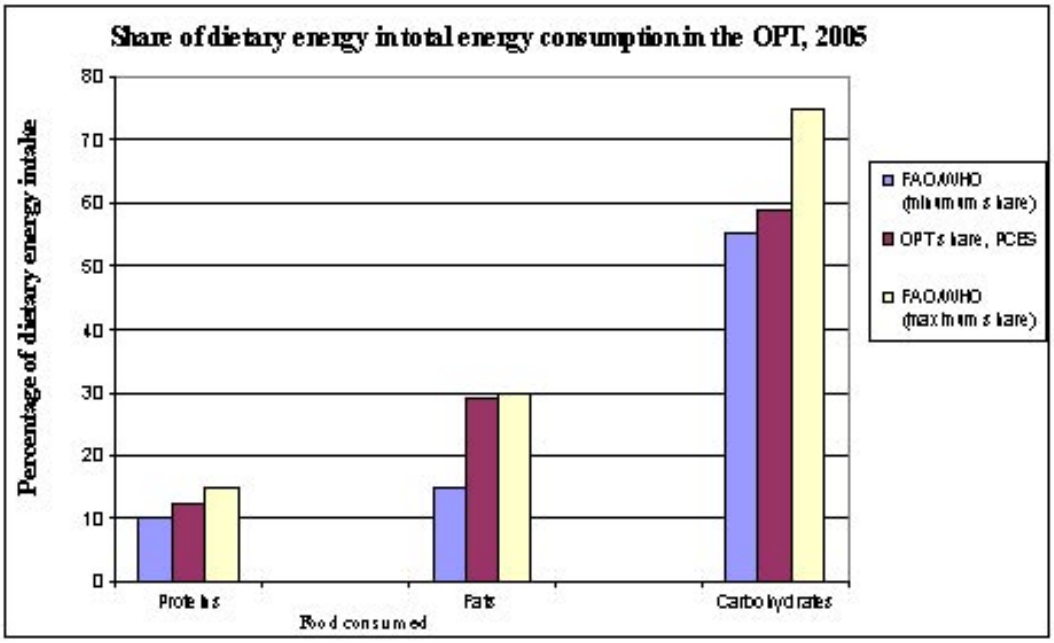


Figure 5.6: Share of dietary energy in total energy consumption in the OPT, 2005 (PCES, 2005).

The DEC relies, in terms of food commodity groups, mainly on cereals and cereal products, contributing 36% of the Total Dietary Energy Consumption (TDEC), which is 204 g/person/day, followed by vegetable oils and fats with 13%, and miscellaneous and prepared food, along with sugar and products which represented, respectively, 11% and 8% of TDEC. Meat provided 7% (109 g/person/day) of TDEC. Finally, vegetables, dairy products, fruits and their respective products contributed each less than 5% of TDEC.

Regarding macro and micro nutrient deficiencies in the OPT, Iron deficiency is considered to be the most prevalent micro-nutrient deficiency, in addition to Vitamin A and Iodine deficiencies. Other micro and macro nutrient deficiencies of concern include Folate, Zinc, Calcium, Vitamin B12, Vitamin D, Vitamin C, and Vitamin E. These deficiencies result in weakened immune system and stunting. A survey conducted in 2006 by the PCBS indicated that 10.2% of children under 5 years were stunted, 1.4% of children under 5 years were wasted, and 2.9% children under 5 years were underweight (PCBS, 2006).

5.2.1 Millennium Development Goals (MDGs) indicators in the OPT

The PNA and the United Nations country team, in cooperation with the MDGs steering committee, prepared the 2005-MDGs progress report to analyze and monitor the progress and trends along the MDGs in the OPT. It is noticed that the Palestinian data are fluctuating between improvements and declines, as a result of the political situation and the Israeli Occupation practices and restrictions in the OPT, where the Occupation has huge and direct impacts on the developmental process.

5.3 Outlook

From the previous analysis, it can be concluded that there are two major agricultural production systems emerging in the OPT. These are the competitive agro-businesses that rely on high inputs and intensive irrigation in greenhouses, geared mainly towards export; and the traditional farming systems that rely mainly on rain-fed farming and mixed agricultural production, geared mainly towards local markets.

Considering the small size of land holdings in the OPT, promotion of medium or large scale agro-businesses is unlikely. However, the Israeli removal of settlers from the Gaza Strip and the transfer of 400 hectares of greenhouses to the Palestinians presented an opportunity for a large scale agro-business

operation. Regrettably, this enterprise failed to achieve its objectives, due to the closure of the Gaza Strip and the subsequent denial of the produce of this enterprise to Europe as was stipulated.

To improve and monitor development in the agricultural sector and improving food security in the OPT, the following main interventions and related activities should be taken into consideration:

A. Agricultural Sector:

- *Current socio-economic situation:* There is a need to foster development of the agricultural sector - a source of house-hold employment, food security and income. (Support rural livelihoods through diversification, input provision, and infrastructure rehabilitation).
- *Increase the potential irrigated area:* It is proposed to encourage water harvesting, as well as re-use of grey water, and to restore and improve the water supply infrastructure.
- *Combat the weak production calendar and low competitiveness of Palestinian agricultural produce*: Encouraging agricultural diversification through the supply of seedlings and seeds of novel non-traditional crop varieties with increased tolerance to the environment, or enhanced yields.
- *Landraces conservation and improvement programs*: local varieties should be conserved and improved through developing a National Seed Gene Bank (NSGB) for local landraces.
- *Diversification in livestock management:* Moving to non-traditional breeds of ruminant and implementation of aquaculture will play an important role in maintaining a viable agricultural sector.
- *Produce geared towards greater market acceptability in external markets:* It is also proposed to assist in the development of post harvest produce, including processing infrastructure.
- *Strategies to enhance coordination and cooperation* between NGOs, community organisations and government bodies are also suggested, in order that interventions may be implemented in an integrated manner across the board.
- *Develop human resources and capacities at the MOA*, and related organizations as well as grass roots.
- *Particular concern is targeting vulnerable groups in the community*, such as women, youth, and the Bedouin.

B. Food Security:

- Promoting Food security through increasing food production, and/or by supplying humanitarian aid. Whilst these aspects in the Palestinian context are key components, a strong cooperation between the PNA and the private sector, with strong contributions from universities, research centers, health workers, the media and others, within civil society, is needed.
- Direct the humanitarian aid in favor of developing initiatives that create wealth and work opportunities, in order to enable people to buy the food that is required to healthy standards.
- Further studies and surveys are needed, especially concerning availability, access and sufficient use of food, including food sources and amount of money spent on food purchases, in comparison to the total household income.
- Improve food-health educational and awareness programs: such programs should be conducted to improve food production procedures and usage in a healthy environment.
- To improve and apply the developed National Food Security Strategy in order to demonstrate clear thinking about how to reduce/eliminate food insecurity through achieving the following objectives:
- Improving availability of food,
- Improving food use/safely,
- Improving access to food,
- Enabling an institutional framework.

Chapter Six

6

Transportation and Energy

6. 1 Transportation

The Palestinians in the West Bank and Gaza Strip don't have many choices as regarding land transportation means. Land transportation means in the West Bank and Gaza are restricted to the urban transit, which is considered a highly specialized mode. It includes traditional mass transit modes such as buses, streetcars, as well as Para transit mode such as shared taxi services. By virtue of the principles of Rio Declaration (Principles 4, 7 and 8), these used traditional transit modes, as it is now, is not a sustainable form of transport for reasons affecting social, environment and health aspects of the local Palestinian communities, in terms of social disintegration, pressure on land and deterioration of public health.

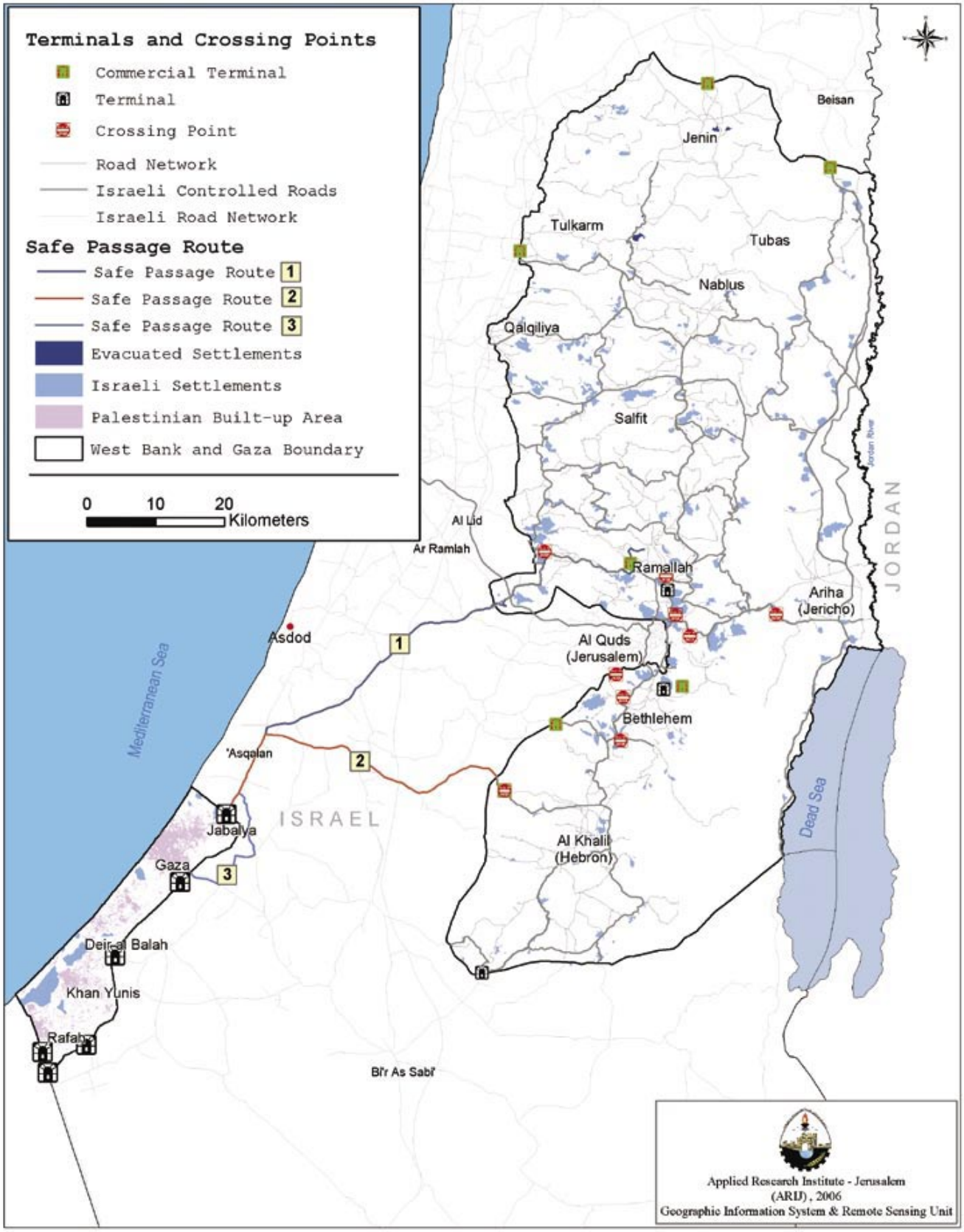
6.1.1 Palestinian Road Network

The current Palestinian road network in the West Bank totals 11,889 km in length, connecting 667 residential communities, and is spread across 5,661 km² of land. More than 90% of this road network is classified as main, main urban, and secondary roads. 53.2% of it is situated in areas "A" and "B" (falling under the Palestinian Authority jurisdiction, regarding the transport sector management). In the Gaza Strip, the road network totals 3,219 km in length, of which 77% is unimproved dirt track; some is merely graded and surfaced with gravel or sand. 12% of the Gaza Strip road network is within the Israeli "Security Zone"[3] and, hence, it is off-limits for Palestinians (ARIJ–GIS Database, 2004), (Map 6.1).

The West Bank and Gaza Strip main road networks, connecting major cities and providing access to nearby villages, total 1,738 km and 185 km, respectively. For the West Bank, this represents an increase of about 38.5% in comparison to the year 1993, and for the Gaza Strip an increase of approximately 76% through the period 1996-2001. What is significant in analysis of the 2004 West Bank's aerial photo, is the high increase in the secondary road length, which has totaled up to 9,076 km, representing 3.6-times increase in the total length since 1993. Data also showed that approximately 6.8% of the total West Bank's road network is comprised of bypass roads.

Most of the current main roads in the West Bank linking Palestinian urban areas are 10-12 m wide and were constructed during the British Mandate and Jordanian Administration periods (1917-1967). Secondary roads are typically 4-8 m wide, and are most densely distributed in Palestinian urban peripheries. Most secondary roads are in a state of disrepair, as a result of vehicle use exceeding designed operational capacity. In addition, the volatile political situation in the OPT has had a direct impact on the state of the road system. Since the outbreak of the Second *Intifada*, the besieging of Palestinian cities and the restrictions of inter-city movement have resulted in a considerable number of secondary roads, serving as primary travel arteries.

In 2003, the World Bank classified about half of the surfaced roads in the OPT to be in poor condition and below acceptable service levels - up by 40% from 1993. World Bank surveys also found 25% of the road network to be in a "fair" condition, and the remaining 25% in a "good" condition. Decline of local road quality, in addition to road use exceeding operational capacity, can be attributed to Israeli military incursions and direct attack on the Palestinian infrastructure (World Bank, 2004).



Map 6.1: Bypass roads, safe passages, terminals and crossing points in the Occupied Palestinian Territory

6.1.2 Means of Transportation

Most Palestinian cities have witnessed rapid growth in transport demand, but because of insufficient public transport services, there has been excessive reliance on private vehicles. The Palestinian Central Bureau of Statistics (PCBS) states that 69.2% of the current registered vehicles are privately owned. Moreover, following the outbreak of the Second *Intifada*, there was a shift away from public transport services, such as buses, in favor of shared taxi services, which became a more favorable option due to the ability to move more easily on secondary roads. Stoppages, blockages, harassment by the IOF, and the lengthy detours necessary in avoiding Israeli settlements and settlers' roads (bypass roads), is an inherent part of travel on main roads, resulting in considerably different journeys, with longer times.

According to the PCBS, the total number of licensed vehicles in the OPT in 2005 was 135,359 distributed as 58.7% in the West Bank, and 41.3% in the Gaza Strip. However, the majority were private cars (69.2%; 65.6% in the West Bank, and 74.3% in the Gaza Strip). The percentage of trucks and commercial cars was 19.9% in the West Bank, compared to 18.8% in the Gaza Strip. Taxis formed 11.4% of the total vehicles in the West Bank, while in the Gaza Strip the percentage did not exceed 2.1%. The percentage of agricultural tractors in the West Bank was 1.2%, while the remaining vehicles (which cover moped, motorcycles, buses, trailers and semi-trailers, road tractors, in addition to other vehicles) formed 2.2% (Figure 6.1). The grand total size of the vehicle fleet in the OPT cannot be specified precisely, because of the high percentage of illegal cars (not licensed) that are in service, and because of the difficulty of calculating the total number of reused or removed vehicles from circulation.

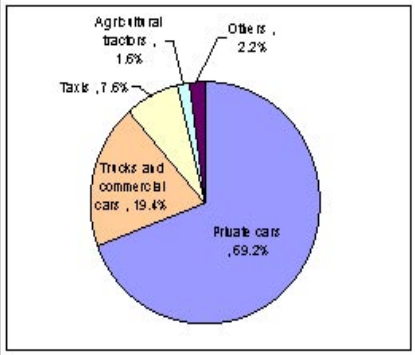


Figure 6.1: Proportion of vehicles in the OPT (Vehicle Fleet, PCBS, 2005)

Forty years of Occupation and chaos have impaired much of the Palestinian productivity potential in transport services and means. Since 1967, Palestinians were left, with only one open land link between the West Bank and neighboring countries, which is the Jordan-River Bridge (Allenby Bridge). Other means of transportation are highly restricted too. The Qalandyia Airport (the only airport in the West Bank, located 9.5 km north of Jerusalem) (ARIJ GIS-Database, 2006) has been inaccessible to Palestinians since 1967, leaving Palestinian travelers with no choice other than using the Israel's International Airport, when it is permissible. However, after the eruption of the Second *Intifada*, all Palestinians were prohibited from using Israeli Airport facilities. In addition, following the Oslo Agreement signed in 1993 and the agreed-upon Arafat International Airport (constructed in 1998; 36 km east of Rafah city, and 2.8 km^2 in area), residents of the Gaza Strip enjoyed just two years freedom of travel before Israel ordered Palestinian aerospace closure on October 8, 2000. Following this, on December 4, 2001, Israel decided on the complete de-capacitating of the Airport, by bulldozing the main runway. Thus, the Israelis restricted the choices for Gazans, who only able from then on, to travel abroad through Rafah border terminal, which is located on the southwest of Gaza Strip as a cross passage between the Gaza Strip and Egypt. Israeli violations against the Arafat International Airport contravene and breaches the Airport Operation Protocols signed with the Israeli Government, which was based on the Wye River Accord that considered the Airport a civilian one (Photo 6.1). Meanwhile, Palestinian transport officials estimate the grand total cost for re-constructing and re-operating the Airport to reach 27 million $ (about 1/3 of the original cost of constructing the Airport).

Photo 6.1: Israeli deep bulldozing of Arafat's Airport main runway in 2001 (MOT, 2006).

Likewise, sea transport is restricted in the Gaza Strip. For instance, the Palestinian proposed seaport in Gaza has never been translated into a reality, because of Israeli reservations, forbiddances and attacks, which resulted in the destruction of the temporarily placed infrastructures' project. In addition, Israel is currently preparing for a floating Segregation Fence along the coast shores of Gaza. This Segregation Fence is 800 m long, and comes as an extension to the 150 m long sea wall segregated by the IOF in the Mediterranean Sea (Photo 6.2), which will deprive more than 3000 of Gaza's fishermen from their livelihood on the long run. Furthermore, the floating Segregation Fence will represent as a formidable challenge in the development of future significant infrastructure facilities (i.e. seaport) for the emerging Palestinian State.

Photo 6.2: Israeli Sea Wall - Ikonos Image, September 2005. (ARIJ, 2005)

6.1.3 Israeli Bypass Roads

Consecutive Israeli governments have implemented the construction of a multi road network, which after 1994, has become known as "Bypass Roads", used only by the Israeli settlers, living illegally in the OPT. An extensive system of the bypass roads has been built in Israeli-controlled areas of the Occupied West Bank with the intention of bypassing Palestinian communities and population centers. These bypass roads provide direct links between Israeli settlements, Israeli cities and military bases. Furthermore, this transportation grid was not only developed to maintain "an internal fabric of life!" (B'Tselem, 2002) for the Israeli West Bank settlers, who were calculated to be 480,000 in 2006 (including the 260,000 Israeli settlers of the Occupied East Jerusalem), but also to completely stop Palestinian traffic through the 207 Israeli settlements, based in the West Bank (including the 33 Israeli settlements, which are based in the Occupied East Jerusalem). In addition, the West Bank bypass road's system has acted to stifle Palestinian urban development.

The idea of constructing designated Israeli roads was first introduced during the settlement push in the late 1970's. However, the implementation phase of these plans began later (in the early 1980's), reaching a peak in 1994. At that time, Israel intensified its efforts to increase the magnitude of the bypass road system in the OPT, which has seriously affected the geopolitical reality of a viable contiguous Palestinian State. In addition, in the creation of irreversible facts on the ground, the Israeli settlements have ultimately affected the outcome of any negotiation process.

International humanitarian law, while allowing an Occupying Power to temporarily seize the private property of residents in an Occupied Territory, it obligates the Occupier to protect the freedom of movement of the people under Occupation, as well as their political, economic, cultural and social rights.

> *"Everyone lawfully within the Territory of a State shall, within that Territory, have the right to liberty of movement and freedom to choose his residence"*. (Article 12.1, International Covenant on Civil and Political Rights "ICCPR").

Today, ARIJ records about 800 km of bypass roads in the Occupied West Bank, with an average width of 20 m, and an average roadside buffer zone of 120 m, purported to serve security purposes of the Israeli settlements and military bases[4]. Israel has confiscated more than 2% of the West Bank area (representing a 100% increase from 1997), in order to surface bypass roads, permitting Israeli settlers to travel by the shortest route across the Green Line to their respective settlements.

The rapid expansion in number and the extensive overall area of bypass roads in the West Bank area is a major disruption to the Palestinian economy, autonomy and society. This issue will undoubtedly feature prominently as a formidable challenge to the emerging Palestinian State in the coming years.

6.1.4 Safe Passages between West Bank and Gaza Strip

Political discourse on the importance of "safe passages" between the West Bank and the Gaza Strip rests on the premise asserted in the 1993-Declaration of Principles (DOP), which states "the Governments of Israel and the Palestinian Authority view the West Bank and Gaza Strip as a single territorial unit." After the Israeli, so-called, "disengagement" (much more a redeployment) from Gaza in 2005, the idea of "safe passages" became apparent once again, to help contribute positively in ameliorating the harsh economic conditions in the OPT, especially in the Gaza Strip.

According to the Israeli-Palestinian protocol concerning "Safe Passage between the West Bank and the Gaza Strip", signed in 1999, the safe passage shall be maintained via the Erez crossing point (for persons and vehicles only), the Karni crossing point (Commercial goods only), the Tarkumya crossing point (for persons, vehicles and goods), and an additional crossing point around Mevo Horon in Ramallah.(Map 6.1).

Palestinian civil society lists several reservations on issues that prejudice the use of safe passages already hindered by the Israeli obstacles and delays. Some of the Israeli conditions and obstacles on which the Palestinians have reservation are the following:

1) The fact that the passages will only operate during daylight hours (from sunrise to sunset), including shuttle buses which will operate only from 7:00 am to 2:00 pm on just two days of every week.

2) The possibility of Israeli authorities to interfere in passages by inspecting commuters, which means that passengers may be subject to arrests.

3) The fact that the safe passages are regular roads used by the Israeli public, passing by Israeli towns and cities, which can be used as an excuse by the Israelis in denying entry to Palestinians as well as commercial goods.

Hence, the Israelis are essentially shaping non-contiguous territorial entities within the Gaza Strip and the West Bank, separated by interconnecting bypass roads and Israeli settlement blocks, including Ariel, Modin Illite, Givaet Za'ev, Ma'al Adumim, Gush Etzion, and Qiryat Arba. Even though the Israelis have argued that Palestinians will have territorial contiguity using tunnels (in 2006 the number of tunnels stood at 25 plus a further 16 planned) and/or bridges, there will be no real sovereign control for the Palestinians. In addition, there will be no control over external borders with neighboring Arab countries, as long as travelers are compelled to go through Israeli controlled areas.

6.1.5 Terminals

The Israeli governments have adopted a policy of physical domination on the Palestinian-Israeli borders through a series of terminals with the purpose of controlling the commercial flow of the Palestinian goods, merchants and workers from the OPT to Israel. Up to this moment, Israeli governments, through a series of military orders, have declared the construction of 24 terminals (17 in the West Bank and 7 in the Gaza Strip) (Map 6.1). Five of these terminals are under construction, which are designed for commercial functions, where cargos are moved "back-to-back" on these terminals. The other five West Bank terminals are already operating and controlling the movement of Palestinians throughout the OPT. Israeli Military Orders issued after September 2005 revealed plans for an additional 7 new terminals.

This policy of Israeli terminals serves as a collective punishment strategy and as a source of impediment to Palestinian movement. An understanding of terminal location reveals that these terminals are located in sensitive areas and are intended to block the usual routes used by the Palestinian population until recently. This has created a group of besieged Palestinian communities. It allowed access to other adjacent Palestinian communities at specific times and under ambiguous, equivocal Israeli procedures. Flow of goods and people between farmlands and towns, towns and cities, and between the OPT and the outside world has been significantly reduced.

6.1.6 Impacts of Transportation on the Environment

The transport sector is one of the most important sectors that constitute the backbone of the Palestinian economy. In 2004, the transportation and communication sectors contributed 5.4% of the total job

opportunities in the OPT. The average monthly working days in this sector were 24.3 days, which is slightly higher than that of the total economic sectors (23.7 days) (PCBS, 2004). The Palestinian Economic Council for Development and Reconstruction (PECDAR) estimates that 70% of the transportation sector contribution (estimated at 5.4% prior to the Second *Intifada*) to the Palestinian Gross Domestic Product (GDP) was set back (PECDAR, 2002).

Because of the volatile geopolitical situation in the OPT, road transport has been highly restricted as a result of permanent and temporal Israeli checkpoints as well as physical barriers. For example, in 2006 the number of the Israeli checkpoints was recorded at 518 (ARIJ-GIS Database, 2006) throughout the West Bank area. Thus, road freight and passenger transport operations are highly restricted within the OPT in general. In the West Bank, in particular, the Israeli Occupiers have enforced cumbersome back-to-back transportation system. Recent studies by the Palestinian Ministry of Transport (MOT) estimate losses of the transport sector through the period 2000–2005 to exceed 343 million $.

Unfortunately, the existing transport sector has caused severe negative impacts on the Palestinian environment. The transport sector is responsible for increased noise levels, habitat loss, water pollution, air pollution, and waste generation. Natural resource's depletion and negative cumulative effects (direct and indirect) are other consequences of transport related activities that likely influence people's health and safety. Road transport accounts for more than 60% of overall energy consumed in the OPT (UNEP, 2005), which makes the transport sector a target field for future energy and environmental research. It is estimated that transport infrastructure (mainly roads) consume 7.42% of the built-up area, and about 3.73% of the total land of the West Bank. Increased land use for transport infrastructure may lead to irreversible impacts on land and natural resources. According to spot analysis of the available aerial photos on the 2004-ARIJ Database, there was in the West Bank 2.1 km of road length per one km^2 of area, as compared to 0.80 km of road length per one km^2 of area in Israel. The West Bank has 5.17 km of road length per thousand inhabitants, as compared to 2.55 km of road length inside Israel. These trends show the extent of the pressure on the local Palestinian environment.

6.2 Energy

Energy is fundamental to the reconstruction and development of the OPT. However, the OPT has no cheaply or easily exploitable energy resources. The OPT currently imports most of its primary energy requirements from Israel, whereby the cost of these imports, compared to the standard of living, is significantly high.

On the other hand, although generation of energy through fuel is critical for life, it is also one of the most environmentally damaging activities, if air pollutant emissions are not controlled. Currently, most industrialized countries depend on fossil fuels for their energy needs. The OPT, like other developing countries, is following in the footsteps of industrialized countries with dependence on oil as a main source of energy. Crude oil is used to obtain kerosene, liquefied gas, gasoline and diesel and to generate electricity.

Charcoal and solar energy are also used, though in limited areas. Charcoal usage is scarce and restricted. In winter, it is used as a source of heat, and in some rural areas it is used for cooking. Solar energy, on the other hand, is widely used for heating water for domestic and commercial usage. About 67.2% of households in the OPT uses solar energy for heating water (59.6% of households in the West Bank and 82.1% of households in the Gaza Strip) (PCBS, 2005).

In the OPT, energy consumption is increasing rapidly. This, of course, reflects the level of development in all aspects of life, as well as population growth. However, development is significantly limited by Israeli control of energy sources and by the high cost of energy, even after signing the Oslo Agreement

with Israel. Since the Occupation of the Palestinian Territory in 1967, Israel has maintained control over fuel and electricity, in order to keep the Palestinian economy dependent upon it.

Figure 6.2 shows the total energy consumption for the peoples in countries of the Middle East (million Btu/capita/yr). As shown in the figure, the Palestinian people in the OPT consume energy much less than the others. The energy consumption was about 11 million Btu/capita/yr in the OPT in 2004 while it reached about 925 million Btu/capita/yr in the United Arab Emirates (UAE) in the same year.

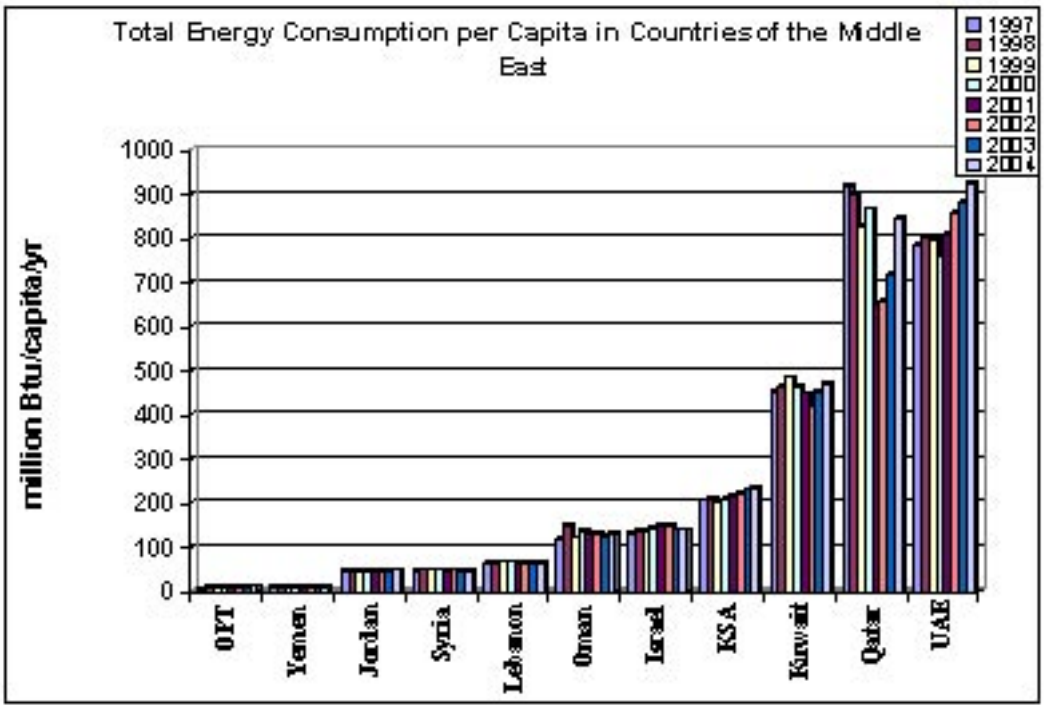


Figure 6.2: Total Energy Consumption (million Btu/capita/yr) in countries of the Middle East.
Source: Energy Information Administration, 2007;
Palestinian Central Bureau of Statistics (PCBS).

6.2.1 Electricity

The OPT imports the vast majority of its electrical energy needs. There is one electric power plant in the Gaza Strip, but this has received extensive damage as a result of Israeli air strikes in 2006. The Palestinian power plant generates about 40% of the electric power consumed in the Gaza Strip, while the rest is imported from Israel. In October 2006, the Gaza Strip connected to the Egyptian electricity network, from which it started to import electricity at a lesser rate than from Israel. The Egyptian electric company is now supplying the southern part of the Gaza Strip (Rafah Governorate) with electricity.

There is no Palestinian power plant in the West Bank, and so all electricity is imported from Israel. The Palestinian electric company (Jerusalem District Electricity Corporation) signed an agreement with the Jordanian Electric Company in August 2006 to supply electricity to the Jericho Governorate in the Jordan Valley, starting June 2007. This electricity will be also less expensive than that supplied by Israel. The percentage of the households in the OPT connected to the public electricity network reached 99.4% in January 2005 (PCBS, 2005).

The cost of electricity is very high in the OPT. It is the most expensive in all the countries in the Middle East. It is higher than in Israel, despite the fact that the standards of living in Israel are high, compared with those in the OPT. The cost of electricity for industry and commercial use is higher than domestic use; a situation opposite to most other countries. The approximate cost of electricity for domestic use is

about 14 U.S cent/kwh, while it is about 18 U.S cent/kwh for industry and commercial use in the OPT (Jerusalem District Electricity Corporation, 2007). Table 6.1 shows tariffs of industrial electricity for selected countries in 2002 to compare with that in the OPT.

Table 6.1: Tariffs of industrial electricity for selected countries in 2002

Country	U.S. cents/ kwh
Czech Republic	4.9
Denmark	7.0
Greece	4.6
Israel	6.2
Hungary	6.0
Ireland	7.5
Jordan	4.2
OPT	18
Turkey	9.4
United States	4.8

Sources: U.S. Energy Information Administration; Jordan Electric Power Company; Jerusalem District Electricity Corporation; Israel Electric Corporation.

The average household electricity consumption (of those connected to the electricity network) in the OPT during July 2006 was 227 kwh, while it was 264 kwh in July 2005, and 380 in the same period in 1999 (PCBS, 2006). The average household electricity consumption differs per region and type of locality. It reached 332 kwh in the middle of the West Bank and did not exceed 196 kwh in the north of the West Bank. The average was about 239 kwh in urban localities, 191 kwh in rural localities, and 229 kwh in refugee camps. The overall average per capita electricity consumption in the OPT during July 2006 was 35.8 kwh.

6.2.2 Gasoline

In the OPT, oil products are used as fuel for transportation, heating and cooking, as well as for some industries (such as stone cutting and aggregate quarrying). Fuel consumption in the OPT is increasing rapidly. The closure of Jerusalem, with the construction of the Israeli Segregation Wall, has led the Palestinians to longer travel distances in order to move between the different localities and especially between southern and northern areas of the OPT, which has resulted in greater fuel consumption.

Fuel in the OPT is imported from Israel at a high cost. The total quantities of imported gasoline in the period 2001-2004 decreased in 2002 and 2003, while it increased again in 2004 as shown in figure 6.3. The decrease was due to the Israeli military attacks during the Second Intifada when movement between Palestinian localities was extremely restricted, as a result of curfews enforced by IOF.

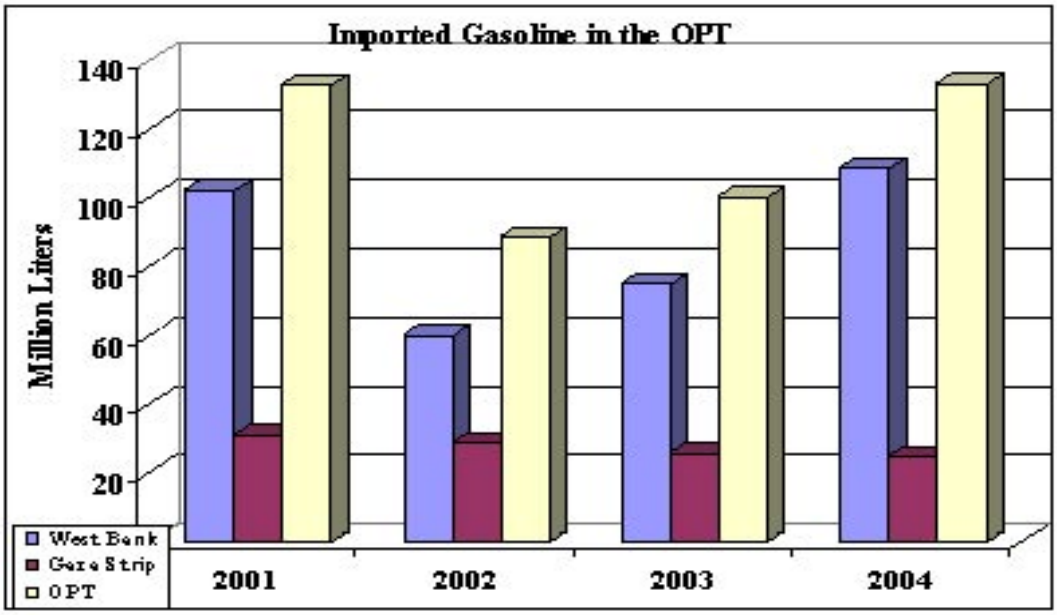


Figure 6.3: Total imported gasoline in the OPT in the period 2001-2004
Source: Palestinian Energy & Environment Research Center, 2005.

6.2.3 Diesel

In addition to the fuel used in transportation, there is also an increase in demand for diesel used for central heating. Most new houses are being built with central heating systems. However, diesel consumption for heating is a relatively new development, and the amount of fuel used is small. Diesel is also used in electricity generation in some industries, including stone cutting and aggregate quarrying. The total quantity of imported diesel in the OPT in the period 2001-2004 shows the same trend as that of gasoline, for the same reasons. The total quantity of imported diesel was about 470 million liters in 2004, in comparison to about 194 million liters in 2002 (Palestinian Energy & Environment Research Center, 2005).

6.2.4 Kerosene and Liquefied Petroleum Gas (LPG)

Palestinians in the OPT import their entire demands of liquefied petroleum gas (LPG) and kerosene. It has been discovered that there is a quantity of LPG beneath the Gaza Strip's coast, but this has not as yet been exploited. Assessment of the quantity of the LPG in the Gaza Strip shows that it will be enough for the OPT for more than 30 years (Al-Hayat al-Jadida newspaper, 26/9/2000). Palestinian LPG will be extracted and distributed by the British Gas Company, which signed an agreement with the Palestinian National Authority (PNA) in October 1999. Until now, because of political instability in the region, the company has not extracted and distributed the LPG.

LPG is used in the OPT as a source of energy for cooking and heating. 96.1% of households in the OPT depends on LPG as a main fuel for cooking (PCBS, 2006). Meanwhile 24.5% of households uses LPG as a main source of energy for heating (36.3% in the West Bank and 1.2% in the Gaza Strip) (PCBS, 2005). In addition, kerosene is used as an energy source for heating in winter. Actually, 7.1% of households in the OPT (0.7% in the Gaza Strip and 10.3% in the West Bank) uses kerosene as a main source of energy for heating (PCBS, 2005).

6.3. Outlook

- Palestinians in charge of planning and management for the transport sector in the OPT are called to carry out the already adopted plans and schedules, planning for the future is equally important to the emergence needs delivered to the Palestinian society. It is never known, when and where Israelis will allow the Palestinian people to access trade corridors, regional linkages, and ports. Palestinian planners must include these measures, acts and other geopolitical constrains in their future plans to ensure that the Palestinian transport infrastructure has the capacity and characteristics to not only support but promote economic activity.

- Palestinian society, especially major urban centers, are in need of more transport structures, including road construction and rehabilitation, and pavements. Ring road developments are welcomed, but mostly may not be a complete solution to congestion related issues. Transportation in the OPT needs qualified and skilled professionals to meet forecasted growth.

- The Palestinian Ministry of Transportation and the other related ministries and authorities have to continue to lead in adopting policies and regulations that would foster the Palestinians' competitive edge by providing an environment of increased, stabilized and alternative financing options, through a participatory public-private partnership.

- Strategies that call for reducing fuel consumption and gas emissions are highly recommended, especially in the Central Business Districts. These strategies must adopt a dual concept of reducing the vehicles fleet used and improving the vehicle efficiency of fuel consumption (increasing the distance traveled per one liter "km/l"). This calls for achieving a balance between demands (discouraging the usage of single-passenger vehicles) and supply (improving the traffic flow through enhancing vehicles efficiency of fuel consumption and/or gas emissions).

- Looking for alternatives of gasoline and diesel engines to use for vehicles to reduce emissions, such as LPG engines besides the hybrid cars.

- Using renewable energy, such as energy generated from solar radiation, wind, and biogas.

- Old vehicles which are consuming more fuels and causing more pollution should be taken out of service and replacing them with modern ones, and encouraging this by customs and tax exemptions.

Part Two

Environmental Challenges

Chapter Seven

Water Resources

7.1. Introduction

Future water security is a cause of concern for both Palestinians and Israelis, as both populations are expected to grow and hence the demand for fresh water will also increase. This is to meet the needs of the present and future population of both peoples and also to allow economic development. Israelis and Palestinians in the Occupied Palestinian Territory (OPT) share the same water resources. These are the West Bank Aquifer System (which can be subdivided into three drainage basins: Western, Eastern and Northeastern Basins); the Jordan River System; and the Coastal Aquifer. Israel has been restricting Palestinian water usage and exploiting Palestinian water resources since Israel occupied the Palestinian Territory in 1967. Presently, more than 80% of the Palestinian water from the West Bank's Aquifer Systems is used by Israel, accounting for 25% of Israel's water needs. On the other hand, the Palestinian people in the OPT are denied their right to utilize their own water resources from the Jordan River's System, which they were utilizing partially until 1967.

As a matter of fact, the discrimination in utilization of the water resources shared, unwillingly, by Israelis and Palestinians is clearly seen in the figures of the water consumption by the two populations. According to the 2005-Israeli Water Commission's data, approximately 4 million Palestinian inhabitants in the OPT utilized only about 323 MCM/yr of their water resources, with their domestic, industrial and agricultural needs. For comparison, approximately 7.0 million Israelis utilized about 2009 MCM/yr. On a per-capita basis and according to the Israeli Water Commission, water consumption by Palestinians is 83 m^3/yr compared to about 277 m^3/yr for Israelis. In other words, the per-capita consumption in Israel is 4 to 5 times higher than the Palestinian per-capita consumption in the OPT. If the this per-capita figure (26 m^3/yr, consumed by Palestinians in the OPT) is taken into consideration, it will be easily noticed that this figure forms only about one-forth of what is recommended by the World Health Organization (WHO) and the United States' Agency for International Development (USAID). This is based on the fact that both institutions (WHO and USAID) recommend 150 liters of water per person per day.

Due to the fact that all the water resources in the region are currently utilized up to, and in some cases, beyond their full sustainable potential, any increase in overall abstraction may cause permanent damage to water quality and sustainable yield. There is already a serious concern about over pumping from the Jordan River and from the Coastal Aquifer (UNEP, 2003). Thus, sustainable management of water resources must be a joint venture, based on equitable allocation and principles of environmental protection, as opposed to the current situation, which is essentially one of the physical domination and oppression. There is an urgent need for negotiation of Palestinian water rights with Israel, and reallocation of existing water resources, in order to ease the suffering of the Palestinians, who currently experience severe water shortages; and to implement environmental protection schemes to halt over abstraction and degradation of groundwater aquifers, particularly in the Gaza Strip.

After the Palestinian people in the OPT fully obtain their water rights in their own water resources, non-conventional water sources can be considered. These non-conventional resources may include: desalination of brackish water and seawater, rainwater and surface run-off capture and storage, and wastewater treatment and reuse, in order to meet the increased water demand that will be a consequence of population growth.

7.2 Water Resources and Palestinian Water Use

7.2.1. Jordan River System

The Jordan River watershed has the largest water yield in the region, as it provides most of the usable surface water supply (EXACT, 1998). The entire length of the Jordan River is 360 km, with a surface

catchment area of 18,300 km^2. As the only significant source of surface water in the region, the Jordan River has been the source of conflicts between the countries that share it. The closest thing to a regional agreement on water utilization between the riparians is the Johnston Plan (1955) (Table 7.1), which was approved by technical committees from Israel and the Arab League, although it was not formally ratified by either the Arab Council or the Israeli Knesset. An important point to note is that when the Johnston Plan was drawn up, the West Bank was under the Jordanian Administration and, hence, the water rights of the Palestinian people in the West Bank were never explicitly defined. However, a canal was planned on the western side of the River (the West Ghor canal) as part of the greater Yarmouk Project, which was to supply 240 MCM of water to irrigate lands in the Jordan Valley (Murakami, 1995; Naff and Matson, 1984). This canal was never built, and following the 1967-war and the Israeli Occupation of the West Bank, 140 Palestinian pumping stations on the Jordan River were destroyed or confiscated. Since that time, Palestinians have had no access to the Jordan River's waters (Agenda 21 in Palestine, 2001).

Table 7.1: Johnston Plan (1955) quotas for water use on the Jordan River and present utilization of water by riparian states (Palestinians not included)

Country	First Johnston Plan	Revised Johnston Plan	2006 Usage	Difference
Syria	50	132	153	+21
Lebanon	0	35	7	-28
Jordan	829	720	480	-240
Israel	426	400	647	+247
Total	1305	1287	1287	0

All figures in MCM water(m^3 x 10^6) per year

Today, the water of the Jordan River is the most significant source of freshwater used in Israel, supplying around 33% of the country's fresh water use (Netanyahu, 2006). The Israeli National Water Carrier conveys approximately 650 MCM of water per year from Lake Tabariyya in the north all the way to the Negev Desert in the south. Very little water is allowed to flow into the Lower Jordan River. The Lower Jordan River and the Wadis along the Dead Sea shores rushed fresh rain water unchecked into the Dead Sea. The Lower Jordan River once discharged 1,320 MCM but now discharges less than 250 MCM of bad quality water (Dead Sea project, 2004). Water quality in the Lower Jordan River is much poorer than in the Upper Jordan River, due to input from saline springs and contamination from irrigation return flows, as well as the diversion of much of the river upstream (EXACT, 1998). There is much concern that the level of the Dead Sea is dropping, due to the reduced input from the Jordan River and increased use of other sources. The surface area of the Dead Sea has shrunk by around 30% in the past 20 years; a drop in water level that translates to the rate of approximately 1 m per year (Dead Sea Project, 2004).

7.2.2. West Bank's Aquifer System

The West Bank's Aquifer System underlies the West Bank, and is primarily recharged from it. Groundwater flows in three main directions and, hence, three main groundwater drainage basins can be identified: Western Aquifer System, Northeastern Aquifer System, and Eastern Aquifer System. The officially recognized annual recharge of these three basins is 362, 145 and 172 MCM/yr, respectively, giving a total sustainable yield of 679 MCM/yr (Article 40, Oslo II Accord, 1995). However, there is some disparity between estimates of annual recharge from different sources (Wilks, 1993; Guttman, 2000), emphasizing a need for further research into and better understanding of the West Bank Aquifer System (UNEP, 2003). It is also the case that the recharge of the Aquifer System fluctuates from year to year, depending on precipitation rate (Sherman, 2001).

Groundwater from the West Bank Aquifer System has traditionally been used for domestic and irrigation purposes both by communities in the West Bank (where the Aquifer recharges) and in Israel (where several

springs discharge). However, following the 1967-war, Palestinians were prevented from developing their utilization of groundwater in the West Bank. A series of Military Orders quickly put all water resources in the newly OPT under Israeli control. Military Order No. 2 (June 7th, 1967) declared all water resources in the OPT to be "Israeli State Property". Consequently, three subsequent Military Orders in 1967 and 1968 granted full control to the military authority, designated an officer to be appointed by the Israeli Military Commander for implementation of the Orders. These Military Orders established a permit system to prevent the Palestinians form drilling new wells, fixing pumping quotas, and declaring all prior settlements of water disputes to be invalid (UNEP, 2003; Daibes, 2003, Israeli Military Orders No. 92, 158 and 291).

In 23 years, (between 1967 and 1990), only 23 permits were issued to Palestinians for drilling wells in the West Bank, of which 20 were for domestic use only (Nasser, 2003). The number of working wells in the West Bank decreased from 413 in 1967 (Nasser, 2003) to 300 in 1983 (Israeli Ministry of Defence, 1983). This was due to drying out of wells caused by the dropping water table, and due to the drilling of deeper wells by Israel, and also due to the fact that owners could not obtain permits to rehabilitate wells or equipment (Nasser, 2003). In the meantime, Israel continued to develop water abstraction from the West Bank's Aquifer, constructing more than 32 deep wells to supply Israeli settlements illegally built on Palestinian land (Trottier, 1999), and moving to exploit the Eastern Aquifer (which lies completely within the OPT) for an additional 66 MCM/yr (Anderson, 1988). By the 1990s, Israel was utilizing approximately 80% (453 MCM/yr) of the water of the West Bank Aquifer System to supply approximately 25% of the country's water use, leaving only 20% (118 MCM/yr) to meet all Palestinian water needs; a situation that persists to this day. In addition, investment in maintaining or improving the deteriorating water infrastructures of Palestinian municipalities during the Israeli Administration of the OPT was extremely low, despite the fact that taxes were being payed by Palestinians to the Israeli government (World Bank, 1993). Thus, many communities were not connected to the water network, and many existing pipelines were old and leaky.

In 1995, the signing of the Oslo Interim Agreement conferred some authority over development and utilization of water resources in the West Bank to the newly formed Palestinian Authority. Article 40 of the Agreement states that Israel "recognizes the Palestinian water rights in the West Bank", but that "these will be negotiated in the Permanent Status Agreement relating to the various water resources". In the meantime, it was agreed upon that "existing quantities of utilization" were to be maintained (Table 7.2), although an additional 28.6 MCM water/yr was to be made available to the Palestinians during the interim period, and the future needs of the Palestinians in the West Bank were estimated to be 70–80 MCM/yr in addition to utilization at the time.

Table 7.2: Extraction and utilization of water of the West Bank's Aquifer System according to Annex III, Appendix I, Article 40 of the Israeli-Palestinian Interim Agreement, 1995

	Israeli Share from			Palestinian Share from			Total Palestinian -Israeli shares	To be developed
Aquifers	**Wells**	**Springs**	**Total**	**Wells**	**Springs**	**Total**		
Eastern	40	0	40	24	30	54	**94**	78
North- eastern	103		103	25	17	42	**145**	0
Western	340	0	340	20	2	22	**362**	0
Total	483		**483**	69	49	**118**	**601**	78

All figures in MCM
Adapted from Israeli Ministry of Foreign Affairs (1995)

Under the terms of the Oslo II Agreement, the Joint Water Committee (JWC) was set up to coordinate the management and development of water and sewage systems in the West Bank. All development of water resources in the West Bank must be approved by the JWC before it can go ahead. This includes rehabilitation of wells, drilling of new wells, and increasing abstraction from any source. Furthermore, construction of pipelines in Israeli controlled areas (Area C) and areas under joint control (Area B)

cannot go ahead without approval. Absolute authority over water resources is retained by the Water Officer of the Israeli Civil Administration, who has the power to veto JWC decisions. There has been much criticism of the JWC since it began work, with accusations from the Palestinian side of obstruction and lack of cooperation by the Israelis (Palestinian Water Authority "PWA", 2003c). It is undoubtedly the case that, despite appearing to be egalitarian in structure, containing as it does equal numbers of representatives from each side, the JWC in fact confers a large advantage to the Israelis for the simple reason that the Palestinians stand in much greater need of developing their water resources and distribution systems.

The Israeli settler population in the West Bank (480,000) has access to ample water supplies; possibly up to 9 times as much per capita as an average West Bank's Palestinian (Freijat, 2003; FMEP, 1998). Water for settlements is supplied by Mekorot, partially from wells within the West Bank, from which over 44 MCM are supplied to settlements (PWA, 2005), and partially from sources in Israel. It has been estimated that settlers use a total of approximately 160 MCM of West Bank Aquifer water per year (Freijat, 2003). Therefore the capacity for Israelis to obstruct desperately needed Palestinian water developments is much greater than vice versa.

To date, the Oslo Interim Agreement has not been fully implemented. Not even the 28.6 MCM for the immediate needs of the Palestinians is fully available. Israeli supply of agreed quantities of water to Gaza has been consistently unreliable (WaSH MP 2004, 2005), and many new wells drilled by the PWA in the Bethlehem and Hebron areas have not produced as much water as was expected, which is due to the instability of the water levels in the Eastern basin, over which they are situated (PWA, 2005). In addition, construction of the Israeli Segregation Wall in the West Bank has resulted in the isolation of 29 groundwater wells and 32 springs used for domestic and agricultural purposes (ARIJ Database, 2006) and 35 km of water pipes, as well as many cisterns and reservoirs (WaSH MP, 2004). Furthermore, 200 cisterns have been isolated behind the wall or confiscated for 'security reasons' (ARIJ Database, 2006). In 2005, abstraction from Palestinian controlled sources in the West Bank totalled just 111.4 MCM (Table 7.3) (PWA, 2005).

Table 7.3: West Bank Water resources and annual abstraction

Water Source	Owner	Number	Annual Yield (MCM)
Agricultural Well	Private	248	30.1
Domestic Well	Municipalities	27	17.2
Domestic Well	JWU	5	2.6
Domestic Well	PWA	8	7.7
Irrigation Spring	Various	96	49
Domestic Spring	Various	16	5.2
Sub-total	**Palestinian control**		**111.8**
Domestic Well	WBWD	10	10.1
Domestic Well	Mekorot	38	56.9
Sub-total	**Israeli control**		**67**
Total			**178.8**

Sources: PWA (2005) and PCBS (2004)

Even if it were fully implemented, the amount of water allotted to the Palestinian people under the Oslo Interim Agreement is not in fact enough to meet the basic needs of the population. It also does not account of population growth or economic development. "Final Status Negotiations" should have taken place before the year 2000 according to the Declaration of Principles (1993). However, they have yet to take place and so many West Bank communities continue to suffer from severe water shortages. Currently 13% of the population of the West Bank, living in 257 communities, remains unconnected to any form of water network (PWA, 2005). These communities are completely dependent upon water

tankers, which fill from various networked sources; and on rainwater collection methods, untreated spring water and agricultural wells. All of these sources carry higher health risks than drinking piped water that has received some form of treatment (Map 7.1). Of the communities that are connected to the network, only 46% have 100% coverage (WaSH MP, 2005).

Map 7.1 Palestinian communities not connected to the water network
Source: PWA, 2005

In 2005, a total of 75.5 MCM water was supplied to West Bank Governorates (PWA, 2005). Of this, approximately 39% MCM was purchased from Mekorot (Figure 7.1) at a cost of 2.42 NIS per cubic meter; a total cost to the Palestinian economy of NIS 94.1 million (21.1 million $).

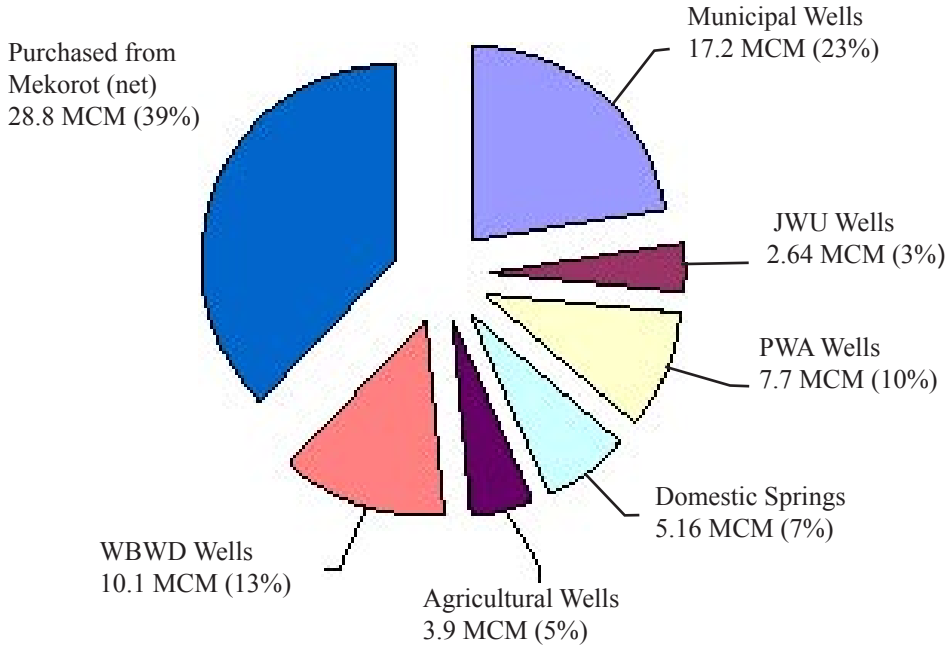


Figure 7.1: Water supplied to West Bank Governorates. (Source: PWA, 2005)

Based on the WHO recommendations that each person should receive 150 liters of fresh water per day, the total deficit in domestic water supply for 2005 was 41.61 MCM for the whole of the West Bank (PWA 2005) (Figure 7.2). Thus, on average, domestic water supply covered only 64% of demand. This deficit is expected to worsen as the population grows.

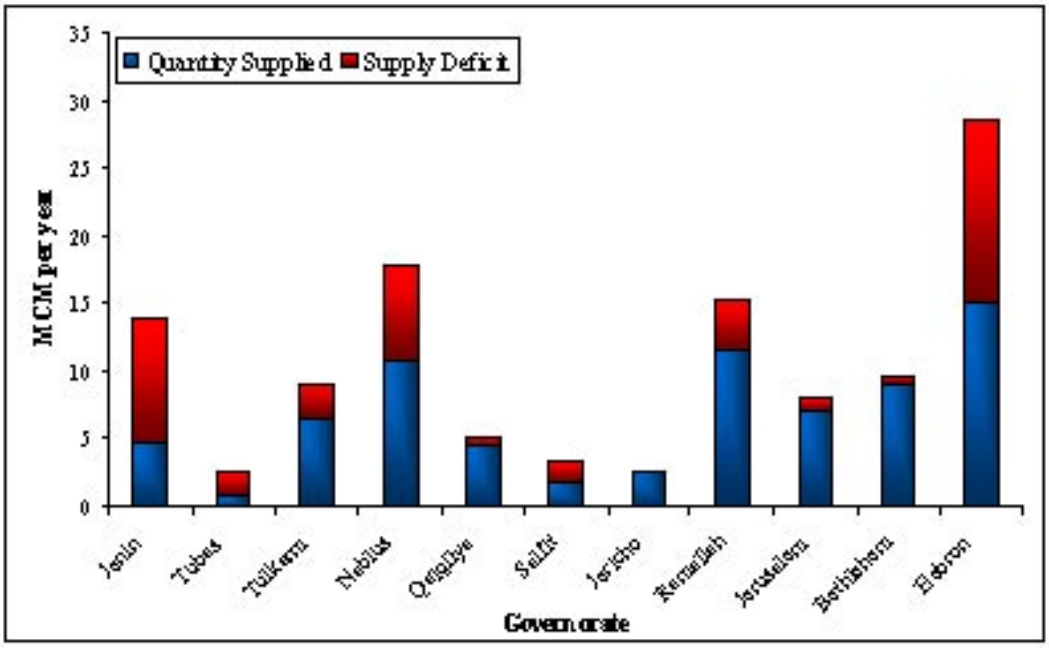


Figure 7.2: Domestic water supply and demand in the West Bank Governorates in 2005. Demand is based on WHO recommendation of 150 L /capita/day. (Source: PWA, 2005)

It is clear that the development of the Palestinian water sector has been, and will continue to be moulded and circumscribed by the Israeli Occupation and Israel's control over the majority of the water resources of the region. In the 10 years since the signing of the Oslo II Agreement, progress in implementing the agreed additional supplies of water to the Palestinian population has been extremely slow. This means that the agreement has never been implemented properly and should largely be considered as obsolete. Thus, there is a great need to reopen negotiations with Israel as a matter of priority, in order to allow development of the Palestinian water sector to progress.

7.2.3. The Coastal Aquifer

The Coastal Aquifer System (which includes the Gaza Aquifer) extends along 120 km of the Mediterranean coastline from Gaza in the south to Mt. Carmel in the north. Its width varies from 3 -10 km in the north to approximately 20 km in the south. It is replenished by rainfall. Approximately 40% of the total annual rainfall recharges the Aquifer System (PWA, 2005). Other sources of groundwater replenishment include groundwater flow from the eastern side, surface water runoff, pipe leakage, return flow irrigation and percolation of wastewater from anthropogenic sources. The natural annual sustainable yield of the aquifer is estimated to be approximately 65 MCM/yr in Gaza (WRAP, 1994) and 320 MCM/yr in Israel (Israeli Ministry of National Infrastructures, 2001), although this figure fluctuates from year to year, depending on precipitation (Sherman, 2001).

Gaza faces a different set of problems due to overpopulation of the area. By 1967, the number of wells in the Gaza Strip was approximately 1200 (Nasser, 2003), pumping 65 MCM/yr, which is approximately the natural replenishment rate of the aquifer (WRAP, 1994). By 1993, as the population had expanded, so too had water use. There were 2100 registered wells and an estimated 900 unregistered wells extracting between 100 and 110 MCM/yr, a figure well above the Aquifer's sustainable yield (WRAP, 1994). At present, there are thought to be 4,000 agricultural wells withdrawing 82 MCM/yr, and 125 domestic wells which extract 74.9 MCM/yr (PCBS, 2005), creating an annul deficit of 44.8 MCM, by which the Aquifer is overdrawn. Under the terms of Oslo II, 5 MCM per year should be supplied by Mekorot; however in recent years this amount has fallen considerably to around 2.8 MCM/yr (WaSH MP, 2005). Thus Gaza's total domestic water supply totals approximately 77.7 MCM per year.

In fact, Israel shares the southern part of the aquifer with Gaza and withdraws 6-10 MCM/yr of saline water for agricultural purposes from wells to the east of the border with Gaza (Weinthal et al., 2005). Recent studies indicate that the major source of the salinity in the Gaza Aquifer is the flow of natural saline groundwater from the eastern part of the Aquifer located in Israel (Vengosh et al., 2002, 2005). Over-pumping of wells in the Gaza Strip increases this flow and, hence, also increases salinity. This has important implications for management solutions, as it is possible that the problem could be partially remediated (or at least slowed) by pumping additional saline groundwater in Israel, slowing the inflow (Weinthaletal., 2005). In 1994, the Gaza-Jericho Agreement ceded sovereignty over the water resources and infrastructure of Gaza to the Palestinian National Authority (PNA) to "operate, manage and develop". By that time, the Gaza Aquifer was and still already seriously degraded. Due to the water deficit, which now amounts to approximately 44.8 MCM/yr (Table 7.4), the regional water levels have lowered and deep hydrological depressions have formed in the urban areas of the Gaza Strip, including the Gaza City in the north and Khan Younis and Rafah in the south.

Table 7.4: Water balance of the Gaza Aquifer

Inflows (MCM/yr)			**Outflows** (MCM/yr)	
Precipitation		35	Domestic wells	74.9
Lateral inflow		36.6	Agricultural wells	82
Return flows	Pipe leaks	12.5	Natural Groundwater Discharge	8.5
	Wastewater	10.5		
	Irrigation	22.5		
	Other*	3.5		
Total		**120.6**	**Total**	**165.4**
Net Balance (Deficit)		**-44.8**		

** This number includes recharge from WWTP and Wadi Gaza*
Source: CAMP (2000) and PCBS (2004)

Thus, the main challenge facing water planners in the Gaza Strip is to reduce pressure on the Aquifer System by identifying and utilizing alternative sources of water. This fact has been widely recognized for some years, with the Integrated Coastal Aquifer Management Plan (CAMP), being drawn up in 2000 (a USAID funded project, in collaboration with the PWA). The main components of the CAMP include reducing the amount of water pumped from the Aquifer for agricultural irrigation, whilst simultaneously improving supply of drinking water to the population by providing additional water from sources other than the Aquifer. These include import of water from Israel, construction of seawater desalination plants, and improving wastewater treatment to allow it to be used for irrigation. In addition, following a political solution in the Middle East, including a resolution of the Palestinians' full rights in their water resources, a pipeline could be constructed between the West Bank and Gaza to ensure adequate supplies for the growing population. If implemented on schedule, it was expected that the CAMP would bring the Gaza Aquifer back into a positive water balance by 2007, whereas "failure to implement the CAMP in accordance with the schedule will result in continuing decline in the quantity and quality of the Aquifer water "(CAMP, 2000). However, due to the ongoing Occupation and political instability in the region, implementation of this Plan has been extremely slow, and most of it remains undone. If no action is taken, there will be an environmental and humanitarian disaster as there will be no fresh water resources in the Gaza Strip to supply drinkable water to about 1.5 million inhabitants in the Gaza Strip.

7.3 Current Institutional Framework

According to the Water Law (2002) the national water policy in Palestine should be determined by the National Water Council (NWC), which is chaired by the President of the PNA. The council consists of representatives of the most important water sector stakeholders and relevant government ministers, and is responsible for approving and ratifying national water policy and submitting it to the PNA for final approval. The NWC should also approve and ratify the tariff structure and pricing system suggested by the PWA, and communicate with the PWA to ensure implementation of national policy. However, the NWC is not yet functioning properly and has in fact only ever met on one occasion. Therefore, much of the work of policy making has in fact been carried out by the PWA, although this is not part of its mandate as water regulator for the sector.

The Palestinian Water Authority (PWA) is the regulatory body responsible for overall management and development of the water sector. Its duties include execution of water policy, ensuring optimal utilization of water resources, allocation and pricing of water, and issuing licenses for development projects. The PWA was formed in 1995 by Presidential Order No. 90, and comes under the direct authority of the PNA's president. It is headed by a director and his deputy and divided into four departments: the Water Resources Planning and Strategy Directorate, the Regulatory Directorate, the Technical Directorate and the Administrative and Financial Directorate. The Project Management Unit (PMU) is a separate body that works in conjunction with the PWA to manage, facilitate and integrate water resources development projects.

The operation and maintenance of bulk water distribution systems is carried out by the West Bank Water Department (WBWD) in the West Bank, and by the Coastal Municipalities Water Utility (CMWU) in Gaza. The WBWD was formed during the Jordanian Administration of the West Bank, but came under Israeli control after 1967. It is still supervised and controlled by the Israeli Mekorot Water Company, pending final status negotiations, although it also acts as an executing organization of the PWA. The WBWD is headed by a General Director who is nominated by the PNA and appointed by the Israeli Civil Administration (ICA) through renewable 6 month contracts. There are three departments: Administration, Planning and Works Supervision and Operation and Maintenance.

The CMWU was formed in 2005, although it is not yet fully operational, to replace the fragmented system of municipal and local water utilities in the Gaza Strip with a unified and coordinated distribution system. In the West Bank, regional, municipal and local water utilities continue to operate and maintain the internal water infrastructure of Palestinian communities; and to set and collect payments for water services. These vary in the scale of their operations from village councils to water undertakings serving several towns and villages (e.g. the Jerusalem Water Undertaking). The fragmented nature of water management in the West Bank can cause complications in developing the sector and in managing and maintaining the infrastructure due to conflicts of interest and infighting between municipalities and lack of technical expertise.

Since the establishment of the PWA, new water networks have been constructed for 32 communities which were previously unconnected to the water network. In addition, 37 old networks have been rehabilitated, and work is in progress to rehabilitate many more (PWA, 2002). However, as with the development of new water resources, gains have been offset by losses. 35 km of pipelines have been destroyed due to the building of the Segregation Wall (WaSH MP, 2004), and the damage to Palestinian water infrastructure during military operations since the start of the Al-Aqsa Intifada in 2000 is estimated to have a value of approximately 15 million $; a figure which does not include the value of wasted water or damage to the sewage infrastructure.

7.4. Water Use in Israel

Israel draws water from several sources. This is in addition to more than 80% of the Palestinian water, which Israel uses annually from the Palestinian Water Resources. There are several smaller groundwater basins within Israeli territory, including the Western Galilee, Carmel, and An Naqab (Negev/Arava) Basins. Total Israeli utilization from fresh water resources currently stands at approximately 1609 MCM/yr, and total water utilization at around 1954 MCM/yr, including desalination and wastewater reuse (Figure 7.3) (Netanyahu, 2006).

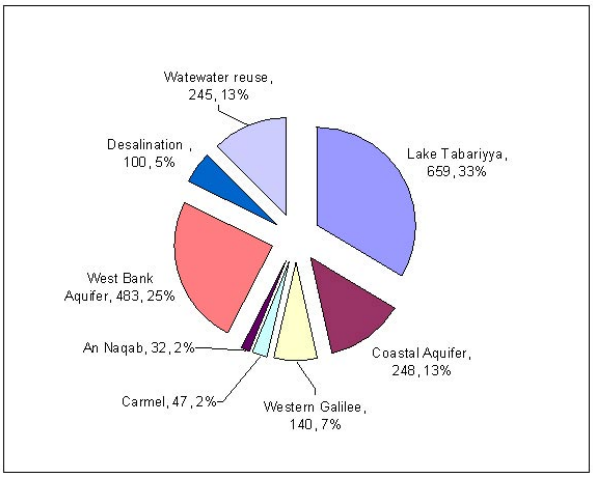


Figure 7.3: Israeli freshwater use (adapted From Netanyahu, 2006)

7.5 Challenges facing the Palestinian water sector

The major challenges facing the Palestinian water sector, the main options for resolving them and the major obstacles that stand in the way of this are summarized in Table 7.5.

Table 7.5: Challenges, solutions and obstacles in the Palestinian Water Sector

Challenge	Possible solutions	Obstacles
Water shortages.	Resolve Palestinian water rights over the surface water (Jordan Rivern System, including the Tiberias Lake) and groundwater resources (West Bank Aquifers System) ; Resuscitate the West Ghour canal project; Rainwater/surface run-off harvesting	Instability and low yield of the Eastern Aquifer; Israeli Occupation and lack of cooperation from Israel; Complex political situation among the Jordan River riparian nations, including the Palestinian people; Funding.
Unserved communities in the West Bank.	Develop water infrastructure (pipelines and reservoirs).	Lack of funding; Lack of cooperation from Israel.
Lack of wastewater infrastructure and treatment facilities in the West Bank and Gaza.	Develop sewage networks and treatment plants; Reuse treated wastewater for irrigation.	Lack of funding; Lack of prioritization; Difficult security conditions.
Degradation of the Gaza Aquifer System.	Desalination of seawater and brackish water; Import of water from Egypt/Turkey; West Bank-Gaza pipeline.	Lack of funding and difficult security conditions; Political complication along the Nile Basin; Water shortages in the West Bank; Lack of cooperation from Israel.
Biased nature of JWC (Joint Water Committee)	Reform joint water management structure.	Need to renegotiate water; Lack of motivation from Israel.
Institutional entanglement of Mekorot and the WBWD (West Bank Water Department).	Take control of WBWD wells; Separate WBWD administration for Mekorot pay-roll and control.	Slow implementation by Israel.
Fragmentation of water management in the West Bank.	Form regional and sub-regional utilities as per the NWP.	Funding; Resistance from powerful municipalities; Lack of training (human resources); Underdeveloped infrastructure.

As can be seen in Table 7.5, an overarching constraint to ameliorating the West Bank's water problems is the Israeli Occupation and lack of resolution of Palestinian water rights. Resolving the Palestinian water rights in the West Bank and fostering cooperation with Israel would also have the potential to go some way towards resolving Gaza's water problems (through building of the West Bank-Gaza pipeline). Under current constraints and agreements, whilst there is still much that can be done in terms of institutional and infrastructural development and also small scale projects to increase supply (such as rain water harvesting and surface run-off capture), these efforts cannot fill the demand gap.

The Red-Dead canal is a much talked about possibility for increasing water supply to Israel, the OPT and Jordan. This idea is based upon using the difference in level between the Red Sea and the Dead Sea (which is 400 m below sea level) to generate hydro-electric power, which can then be used to desalinate approximately 850 MCM of salt water per year. Brines could be used to restore the level of the Dead Sea and the desalinated water would be split between Israel, Jordan and the OPT. However, the feasibility study was planned to be executed under the authority of the World Bank in 2006, alone (partially funded by the World Bank) will cost US$ 15 million, and the project an estimated $3 billion. There remain many environmental and social issues that have not been properly and scientifically addressed (the effect of the brines on the Dead Sea, the effect of the canal outlet on the Red Sea, the fact that the pipeline will cross a seismically active area, etc.) and there is also a great deal of concern that the Palestinians will be excluded from benefiting from the project, which will be pushed through by Israel, Jordan and their contractors and funders.

7.6 Outlook

Water is recognized as a nascent source of conflict between Israel and the Palestinian people. The Palestinian people in the OPT are facing an acute water crisis not only because of the area's aridity, but primarily because of the political conditions represented by Israel's control over the Palestinian water resources. Palestinian water rights include the underground water of the West Bank and the Gaza Strip, in addition to their rightful shares in the waters of the Jordan River System including Tiberias Lake. Even Israel recognized Palestinian water rights when it signed the Oslo Accords, but regrettably the details of these rights were to be negotiated in subsequent permanent status negotiations. To date, however, no negotiations have been held. It is evident that the Oslo II Interim Agreement has placed significant constraints on development of the Palestinian water sector. Thus, the Palestinian people must develop and mange their water resources efficiently, in order to meet present and future water needs in an environmentally sustainable way. International donors and aid agencies will continue to play a vital role in the development of the Palestinian water sector, as the PNA does not have the funds to instigate all the necessary projects. Simultaneously, the capacity of Palestinian institutions to manage water resources and maintain infrastructure must be strengthened, such that long-term sustainable management of water resources is possible.

Pursue Palestinian Water Rights

- Give utmost priority to restore Palestinian water rights over the surface water (Jordan River) and groundwater resources (all if the West Bank Aquifer Systems) in final status negotiation.
- Demand Palestinian sovereignty over all of their water resources.
- Increase the current water allocations for Palestinian people in the OPT.
- Exert pressure on Israel to fulfill its obligations related to water allocations according to signed agreements.
- Include the issue of compensation for Israel's past and current illegal and unlawful use of the Palestinian waters.
- Resuscitate the West Ghor canal project and mobilize regional and international support of this project.

Increasing Water Supply

- Continue development of new wells, reservoirs, pipelines, and new water infrastructure.
- Surface run-off capture: Approximately 64 MCM/yr of surface runoff in the West Bank is not utilized. Some of it is urban runoff which could be captured and stored by building drainage systems and cisterns, whilst some flows intermittently in flood wadis and could be captured using storage dams and pools.
- Rainwater harvesting: 240,000 houses in the West Bank have no roof-top cisterns. These could be installed at relatively low cost to harvest approximately 19 MCM/yr.
- Increase desalination: Build more seawater and brackish water desalination facilities in the Gaza Strip.
- Utilization of brackish and treated waste water in agriculture.

Protecting Water Resources

- Build wastewater treatment facilities and sewage pipelines, and preventing any construction of solid waste deposit sites in any sensitive area to groundwater resources.
- Reduce pumping from the Gaza Aquifer.
- Ensure strict enforcement of well-drilling regulations, especially in the Gaza Strip.

- Legislate against the use of toxic agrochemicals.
- Manage disposal of solid, industrial and toxic wastes.
- Increase public awareness related to the protection of water resources.

Institutional Development

- Strengthen national water management bodies including the NWC, PWA and WBWD, to allow sound policy making and integrated development.
- Separate the WBWD from Mekorot.
- Reform the JWC and renegotiate joint water management protocols with Israel.
- Build capacity of regional and sub-regional utilities to promote sound lower level management and maintenance.

Regional Cooperation

Regional cooperation in water management must follow resolution of the Israeli-Palestinian water conflict. The illegal Occupation by Israel of the Palestinian Territory and the annexation of Palestinian land and natural resources by Israel are at the heart of tension between Israel and the Arab States of the region. Thus, resolving the water conflict with the Palestinian people in the OPT will lay the foundations for regional agreements on water utilization and sound environmental management.

Chapter Eight

8

Waste

8.1 Introduction

At present, the Palestinian environment is severely threatened by an improper waste management. Despite high donor investment and the Palestinian efforts towards rehabilitating the infrastructure that was neglected during the Israeli Occupation, large efforts still needed to promote and achieve an environmentally sound management in the Occupied Palestinian Territory (OPT).

8.2 Wastewater

The existing practices for managing domestic wastewater are limited to the collection of the generated wastewater by sewage networks and/or cesspits, and final discharge into the sea (as in the case of the Gaza Strip) and open areas (as in the case of the West Bank). Concerning the domestic wastewater management, the existing conventional gravity sewage networks serve approximately 43 % of the West Bank and Gaza population (PCBS, 2006). About 90% of the generated wastewater in the West Bank is currently discharged untreated into the environment.

The existing improper management of wastewater poses a severe environmental threat, in terms of its capacity to deterioration of nature and biodiversity, as well as groundwater quality. It has also posed serious public health risks, represented by the spread of diseases arising from the contamination of food, water, air, and soil. Improving wastewater management is one of the greatest challenges facing environmental planners in the OPT. The wastewater management has been identified among the most urgent elements in the Palestinian Environmental Strategy (PES). The PES calls for maximizing the coverage of household's connections to the sewer system, rehabilitating the existing wastewater treatment plants and/or constructing new treatment plants. Treated wastewater is considered a vital resource that can replace fresh water used for irrigating agricultural lands. Thus, if wastewater could be treated to an adequate standards, it could be reused for irrigation purposes, relieving pressure on precious fresh water resources in the OPT and, thus, contributing to solving the water crisis in the region.

However, the planning and execution of development projects are complicated and constrained by the continued Israeli Occupation of the Palestinian Territory. This adds layers of beaurocracy to the planning and permitting processes, considerably retarding progress, besides directly damaging infrastructure through the Israeli military aggression. Thus, there is an urgent need for progress in the political situation and for international pressure to be brought to bear on Israel to desist from targeting the Palestinian infrastructure of wastewater and otherwise.

8.2.1 Status of Wastewater Infrastructure

8.2.1.1 Wastewater Generation and Collection

A total of approximately 66 MCM of wastewater was generated in the OPT in the year 2005 (Table 8.1). Of this only about 36.5 MCM (55.3%) is collected by the sewage network (Table 8.1). In the West Bank, only 56 communities are connected to sewage network, whereas 513 communities use cesspits to dispose their sewage. In the Gaza Strip, 19 communities are connected to the sewage network, whereas 11 communities use cesspits (PCBS, 2006). A wastewater collection network is limited to the major cities in the OPT. Many of these networks are poorly designed and suffer from leakage, especially those implemented during the 1970s. Moreover, many sewage collection pipes are of a small diameter (8-12 inches), insufficient to deal with the input into them, making blockage and flooding frequent

phenomena (Tulkarm Municipality, 2006). Thus, even existing systems need rehabilitating and upgrading. Wastewater collection networks in the Palestinian refugee camps (in both of the West Bank and the Gaza Strip) are either not present or undeveloped and primitive. Most camps use open channels to convey wastewater away from dwellings. From the data shown in Table 8.1, it is evident that there is a need for development in every governorate in the OPT, and that the sewage collection network in the West Bank is more underdeveloped than that in the Gaza Strip. This is clear in terms of sewage collection systems (Table 8.1). However, in the Gaza Strip, it is primarily the refugee camps that require development. El Nuserrat, El Bureij, El Maghazi and El Zawida are all densely populated camps that do not have any sewage facilities.

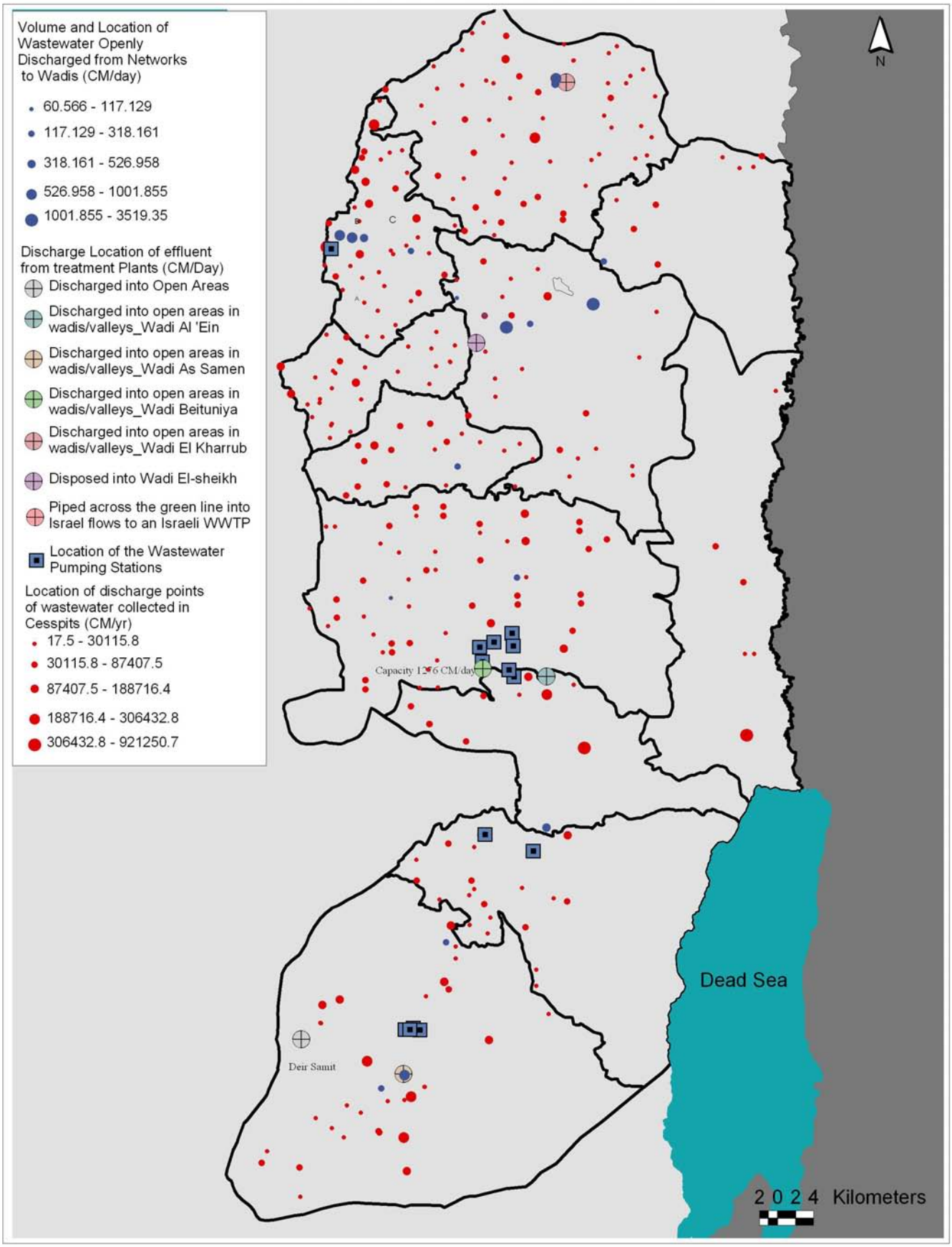
Table 8.1:Annual volume of collected wastewater in the OPT

Governorate	Population (2005)	Total Wastewater Generation (MCM/yr)	Volume of Wastewater /(MCM/yr)		
			Collected by Sewage Network	Collected in Cesspits	Discharged into Open Channels
Nablus	326,873	2.299	1.236	1.057	0
Ramallah	280,805	0.374	0.104	0.252	0.014
Jericho	43,620	3.182	0.000	3.182	0
Jerusalem	149,150	5.208	0.954	4.248	0
Bethlehem	174,654	2.160	0.990	2.154	0
Jenin	254,218	0.902	0.126	0.168	0.044
Tubas	46,664	1.291	0.004	1.134	0.151
Tulkarm	167,873	5.611	2.508	3.102	0
Qalqiliya	94,210	3.355	1.542	1.806	0
Salfit	62,125	4.358	0.660	3.690	0
Hebron	524,510	7.267	2.322	4.722	0.216
West Bank	**2,124,702**	**36.010**	**10.447**	**25.5156**	**0.425**
Deir Al-Balah	201,112	2.760	2.538	0.221	0
Gaza	487,904	16.806	16.602	0.198	0
Khan Yunis	269,601	4.032	2.580	1.446	0
North Gaza	265,932	4.380	2.759	1.620	0
Rafah	165,240	1.980	1.500	0.474	0
Gaza Strip	**1,389.79**	**29.940**	**25.979**	**3.959**	**0**

Source: ARIJ Data Base, 2006

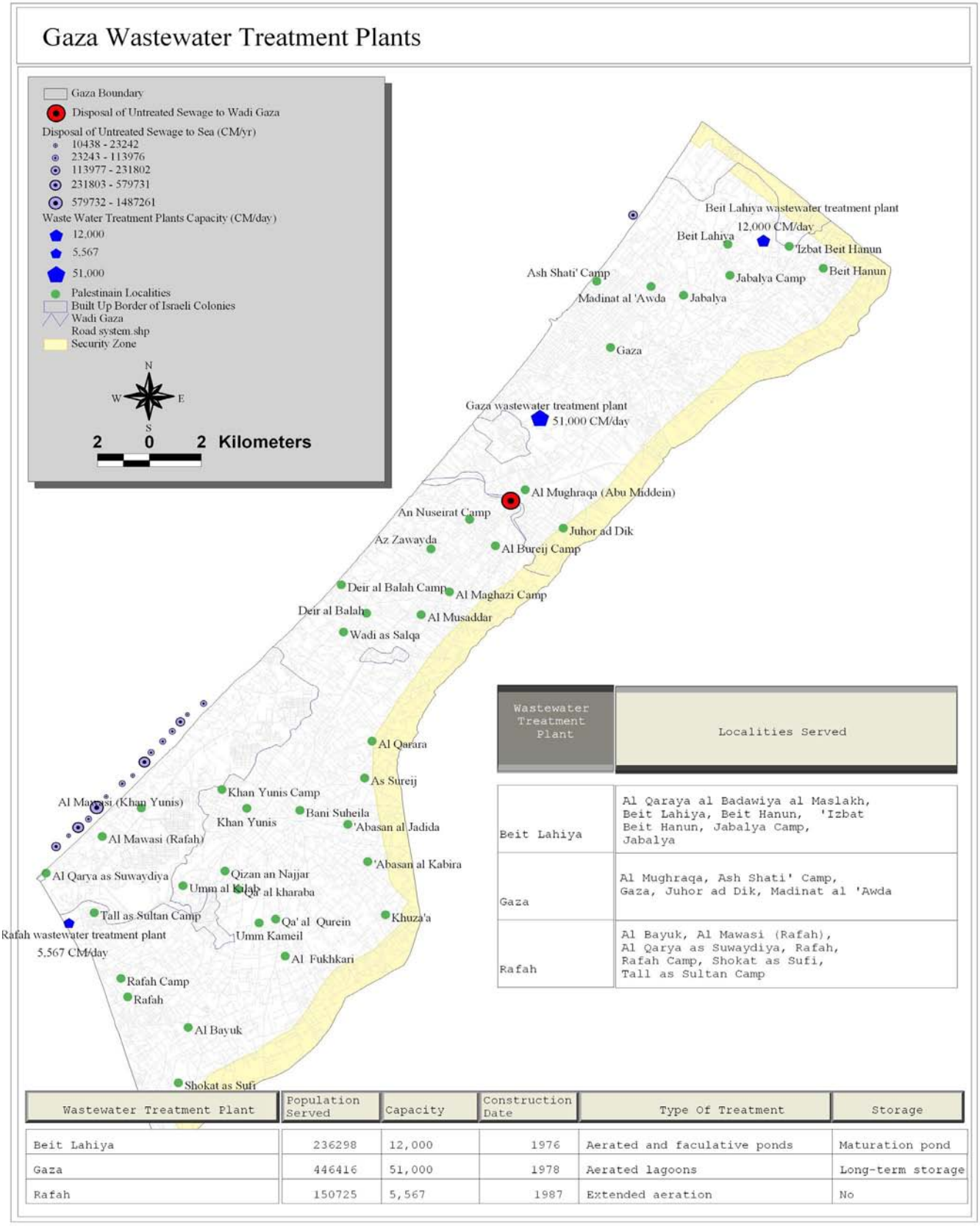
Cesspits have been the traditional mean of disposing of sewage in the OPT. They vary in size, depending on the number of homes they serve, the availability of land and the cost of construction. Their capacity ranges between 5 and 50 m^3. They are deliberately constructed without a concrete liner, in order to encourage seepage into the ground. Hence, they have high potential to cause pollution of groundwater. Periodically cesspits become full and are emptied by vacuum tankers which are owned by municipalities or private businesses. However, in the absence of adequate treatment facilities, the vacuum tankers mostly release the sewage into nearby wadis or onto a piece of disused land, causing further pollution.

A field survey conducted by the Applied Research Institute-Jerusalem (ARIJ), shows that the number of sites where the collected wastewater is discharged directly into the environment is around 363 main disposal sites in the West Bank (Map 8.1). These sites represent hot pollution spots over the highly permeable recharge areas of the West-Bank aquifers and, thus, threaten the groundwater quality (Rishmawi et al., 2004). The major wastewater stream flow is in Wadi Zeimar, Wadi el-Sajour (Nablus), Wadi Beitunia (Ramallah), Wadi en-Nar (Bethlehem), and Wadi as- Samen (Hebron).



Map 8.1: Locations of open wastewater discharge sites in the West Bank (ARIJ, 2005)

In the Gaza Strip, there are approximately 20 discharge sites, primarily around Wadi Gaza and along the southern portion of the coastline (Map 8.2).



Wastewater Treatment Plant	Localities Served
Beit Lahiya	Al Qaraya al Badawiya al Maslakh, Beit Lahiya, Beit Hanun, 'Izbat Beit Hanun, Jabalya Camp, Jabalya
Gaza	Al Mughraqa, Ash Shati' Camp, Gaza, Juhor ad Dik, Madinat al 'Awda
Rafah	Al Bayuk, Al Mawasi (Rafah), Al Qarya as Suwaydiya, Rafah, Rafah Camp, Shokat as Sufi, Tall as Sultan Camp

Wastewater Treatment Plant	Population Served	Capacity	Construction Date	Type Of Treatment	Storage
Beit Lahiya	236298	12,000	1976	Aerated and faculative ponds	Maturation pond
Gaza	446416	51,000	1978	Aerated lagoons	Long-term storage
Rafah	150725	5,567	1987	Extended aeration	No

Map 8.2: Location of open wastewater discharge sites in the Gaza Strip

8.2.1.2 Wastewater Treatment

It is important to note that not all collected wastewater receives treatment. The centralized wastewater treatment plant, existing in Al-Bireh in Ramallah Governorate, which was constructed in 1998, with funding from the German Development Agency (KFW), is the only functioning wastewater treatment plant in the West Bank. Approximately 7% of the total wastewater generated in the West Bank is treated in that plant, meaning the remaining 93% is discharged untreated into the environment. Some of the untreated wastewater flows eastwards in wadis towards the Dead Sea (e.g.,Wadi en-Nar, which carries wastewater from Bethlehem, Abu Dis and Jerusalem), and some flows west into Israel (e.g., Wadi Zimar, which carries wastewater from Tulkarm). In several instances, this wastewater is treated in Israeli treatment plants and reused for irrigation purposes. The cost of this treatment is normally charged to the PWA (Palestinian Water Authorities), at a cost of approximately 2 NIS per cubic meter (Tulkarm Municipality, 2006). It would, therefore, be economically sensible for Palestinians to build their own treatment plants and reuse the water generated, rather than both paying Israel for treatment and forfeiting the right to reuse the water.

In the Gaza Strip, there are 3 centralized wastewater treatment plants, located in Gaza City, north Gaza (Beit Lahia), and Rafah. However, these plants are functioning at moderate efficiency rates, ranging between 40-60%, and do not have the capacity to treat the volume of wastewater generated by the ever expanding population. Both the partially treated and untreated wastewaters are discharged into open areas, such as Wadi Gaza or into the Sea and sand dunes.

8.2.2 Development of Palestinian Wastewater Management

Wastewater management's problems in the OPT have been exacerbated by the Israeli Occupation. The underdeveloped wastewater infrastructure that was neglected thoughtout the Israeli Occupation period, has suffered from severe damages, as result of the practices of the Israeli Occupation Forces (IOF). Pipelines, wastewater pumping stations, and treatment plants were damaged during the incursions of the IOF. Moreover, several Wastewater treatment plants, such as Beit Lahaia (in the Gaza Strip) sustained damages from the Israeli military actions and shelling.

On March 27th 2007, the western embankment of the Beit Lahia plant collapsed under strain, releasing an estimated 70,000 m^3 of barely treated sewage onto the lands below it. The north-eastern lands of the adjacent village, Om-Al Nasser, were inundated with the wastewater deluge. The village was damaged, ecologically, environmentally, and economically, which resulted in the flooding of 30 houses and the reported deaths of 6 people (Photo 8.1).

Photo 8.1: Flooding of approsimately 30 houses that were located in the lower lands close to Om - Al Nasser wastewater lagoons due to the collapse of the lagoon embankment

The urgency of remediating Palestine's wastewater management's problems has been recognized both by the Palestinian Water Authority and by international donors. The international community have currently committed over $230 million to developing the wastewater sector (FOEME, 2006). In the West Bank, wastewater treatment facilities are in the planning and implementation stages at Salfit, Nablus, Tulkarm and Hebron Governorates. In addition, construction of pipelines is planned for communities in Jenin and Ramallah Governorates. These projects are predominantly funded by KFW and USAID. However, following the victory of Hamas in the 2006-elections, several projects were frozen. In the Gaza Strip, there are plans for three regional wastewater treatment plants (WWTPs). Feasibility studies have been completed for the northern and central plants, and funding was committed by the World Bank, EU, French Development Agency, Swedish Development Agency, and German Development Agency. These facilities are expected to be operational by 2010, at the earliest, although projects have currently stalled due to the political instability in the Gaza Strip and due to some administrative problems, associated with cooperation among so many donors. There is also another plan, to develop a WWTP in southern Gaza (Khan Younis) funded by Japan. In addition to regional WWTPs, several NGOs, such as the Palestinian Hydrology Group (PHG), Applied Research Institute-Jerusalem (ARIJ), and Palestinian Agricultural Relief Committee (PARC), have been implementing small scale WWTPs, designed to serve single buildings or/and small clusters in various locations in the West Bank. These are particularly suited to rural communities, where the dispersed pattern of houses makes it economically unfeasible to construct centralized wastewater treatment facilitie

In August 2005, engineers of the Water and Environment Research Unit at ARIJ constructed a small wastewater treatment plant based on the 'up flow sludge blanket filtration system'. This was constructed with financial assistance from the Ministry of Higher Education. The effluent quality is being monitored and evaluated periodically. The construction materials were carefully selected to ensure ease of availability in the local market and to assure a long life expectancy, with the idea of finding the best treatment technologies in the construction of on site small scale wastewater treatment plants for being utilized in the rural Palestinian communities. The development of efficient and low running cost technologies has been considered by ARIJ of great importance, since an adequate treatment to the generated wastewater not only represents a solution to the problems generated by untreated wastewater, but also represents a water resource that can be utilized for agriculture and landscaping.

In the Nahhaline village in Bethlehem Governorate, ARIJ is presently constructing a small-scale wastewater treatment plant that will serve approximately 1,300 persons. The Mennonite Central Committee (MCC) and the Swiss agency for Development and Cooperation (SDC) are funding the project. Effluent from that plant will be reused for agricultural purposes.

Small Scale Wastewater Treatment plants

It should be noted that the planning and permitting process as for development projects have been lengthened and became more complicated by the division of the OPT into areas A, B and C (according to the Oslo II Agreement in 1995). Moreover, all water projects in the OPT must be approved by the Joint Water Council (JWC). This additional layer of beaurocracy can add many more months to the project planning and permitting processes and has been used to force the Palestinians to add the illegal Israeli settlements to the planned sewage networks, legitimizing their presence in the Occupied West Bank (e.g., Pizcoat Israeli settlement near Al Bireh). In addition, projects are often stalled due to Israeli military actions (e.g., Beit Lahia Treatment Plant Rehabilitation, 2006).

8.3 Solid Waste

The term solid waste is used to describe any solid, liquid, or contained gaseous material discarded from industrial, agricultural, mining, or commercial operations, as well as household activities (National Safety Council, USA, 2005). Most solid waste in the OPT is composed of organic materials, paper, cardboard, plastics, metals, and glass. The severity of the solid waste situation in the OPT can be attributed to many factors. These include: the continuing fiscal crisis, due to Israel's withholding of Palestinian tax revenues and the boycott on international aid; the lack of infrastructure for solid waste disposal, including sanitary landfills and recycling facilities; the physical damage caused to infrastructure and equipment by armed conflict; the lack of public awareness on how to properly dispose of solid waste and the need for doing so; the weak and under funded environmental institutions on the national level; and the continual interruption of public civil services, by the Israeli Occupation, especially with respect to the constant military incursions, the Segregation Wall, and the Israeli settlements.

The fractured regime of solid waste management in the Occupied Palestinian Territory (OPT) threatens public health in the region, damages the Palestinian environment, and, as population levels increase, is ultimately unsustainable. Multiple entities, including the Palestinian government, local and foreign NGOs, donor governments, the US Agency for International Development, and various organs of the United Nations, have made attempts over the years to improve infrastructure, to coordinate planning, and to educate the public. These efforts have borne some fruit, but the realities of the Israeli Occupation, especially over the last six years (2001-2007), have prevented any prospect of steady, across-the-board improvement in solid waste management. Palestinian authorities within the OPT, with help from external organizations; will continue to work towards greater effectiveness in serving the population's needs for solid waste collection and disposal. But without significant development in the political realities of the OPT, satisfactory results are most likely out of reach.

Traditionally, solid waste collection and disposal in the OPT have been handled on the municipality level (though necessary equipments have usually been provided by donor nations and international organizations) and administered by the Palestinian National Authority (PNA). The Ministry of Planning and International Cooperation (MoPIC); the Joint Councils for Services, Planning and Development (JCspd); the Environmental Quality Authority (EQA), the Ministry of Local Government (MLG); and the United Nations Relief and Works Agency for Palestinian Refugees (UNRWA) all have control over various facets of solid waste management in the OPT. Actually, this abundance of authoritative agencies has added to the confusion. Currently, two new sanitary landfills are operation in the West Bank namely; Zahret El-Fengan- located in the Jenin/Tubas area in the northern West Bank and the Jericho located in the Jordan Valley. By 2006, 27.8% of Palestinian localities (all located in the West Bank) are still not provided with solid waste collection by their municipalities or other public authorities (PCBS, 2005). This uncollected solid waste is often destined for uncontrolled dumping and informal incineration sites (such as vacant lots, residential streets, remote areas).

In recent years, multiple sources have noted that the accelerating pressure upon the Palestinian landscape, population and the environment have caused by steadily increasing production of solid waste. The report, 'The Status of the Environment in the West Bank', published by the Applied Research Institute – Jerusalem (ARIJ), noted the environmental ramifications of the solid waste problem towards the atmosphere, water supply, and human health (ARIJ, 1997). The "Palestinian Environmental Strategy", a document produced in 1999 by the Ministry of Environmental Affairs (MEA), identified the need for at least five new sanitary landfills in the West Bank and two in the Gaza Strip in order to stem serious deterioration of water, land, and air quality (MEA, 1999). A team of environmental experts, from the United Nations' Environment Program (UNEP) in 2003, found the extent of environmental degradation occurring in the OPT to be 'alarming,' and identified the solid-waste management issue, as one of the most critical problems (UNEP, 2003). As of 2006, the majority of strategic goals for solid waste management laid out by the "1999-Palestinian Environmental Strategy" had not yet been achieved.

As the fiscal health of the Palestinian National Authority fluctuates with the uncertainty of transferred tax revenues and international aid, and as the situation in the West Bank and the Gaza Strip varies, the progress of Palestinian efforts on the municipal and national levels to improve collection and disposal of solid waste is thrust into jeopardy. Most worrisome, the Israeli reinvasion of the Gaza Strip in 2006 certainly had an adverse impact on solid waste management.

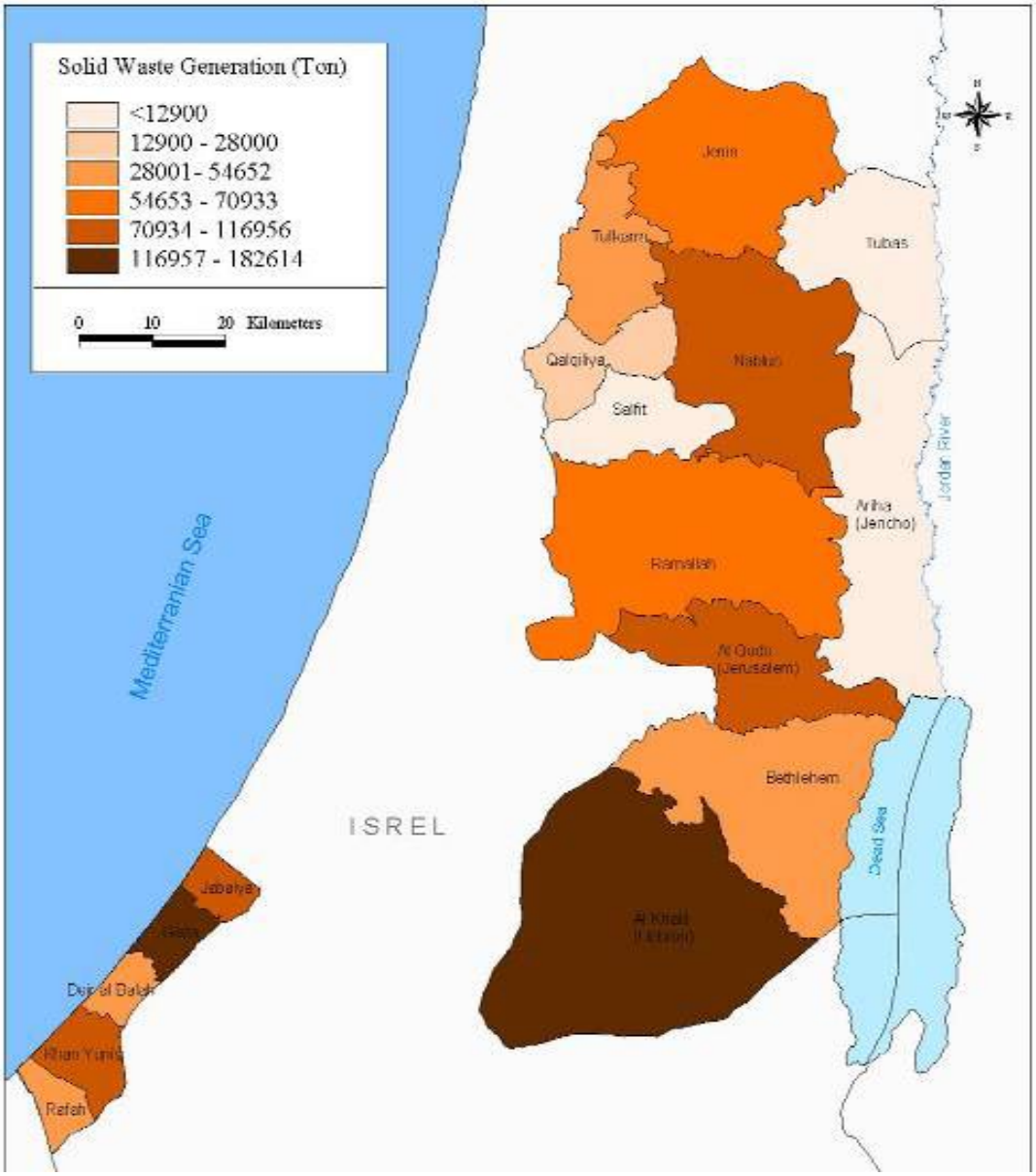
8.3.1 Status of Solid Waste

The state of solid waste management in the OPT has much improved over the last decade. Collection routes have been expanded to a greater percentage of the population, and decentralization has enabled more small communities to manage their own solid waste disposal. Still, many challenges face Palestinian authorities, in terms of improving waste management, including:

- Rapid population growth and increased solid waste production.
- Persistent public ignorance on sensible waste management procedures.
- Israeli restrictions of movement of Palestinians, which prevent extension of services to any region.
- Israeli military disrupting of civil services.

8.3.1.1 Solid Waste Production

The average Palestinian household produces approximately 4.6 kg/day of solid waste (PCBS, 2006). As individuals, rural Palestinians produce the least solid waste, on the order of 0.4-0.6 kg/day. They are followed by residents of refugee camps (0.5-0.8 kg/day), town/village dwellers (0.6-0.8 kg/day), and city-dwellers (0.9-1.2 kg/day) (ARIJ, 2006). The total daily tonnage of household-produced solid waste in the West Bank is 1,728.2 tons, and in the Gaza Strip equals 1,116 tons (PCBS, 2006) (Map 8.1). The per capita solid waste production in the OPT is similar to other states in the region, such as Jordan, with a per capita rate of 0.9 kg/day (UJRC, 2001). Israeli levels of solid waste production are in line with nations such as the USA, whose residents produce 2.04 kg/day of solid waste on average (US EPA, 2003).



Map 8.3: Solid Waste Production in the OPT

8.3.1.2 Composition of Solid Waste

There are three main sources of solid waste in the OPT. These are: **1)** The household waste category, which accounts for 45-50% of the total waste. **2)** The industrial waste category, which accounts for 20-25%. **3)** The commercial sector, including offices, restaurants, places of business, hotels, and public services, which accounts for 25-30%. The combined solid waste (household, industrial, commercial) consists mostly of the following categories: Organic materials, such as food waste or weeds; paper and cardboard, including newspaper, magazines and cartons, glass, metals and plastics. In the West Bank and the Gaza Strip, 41-67% of the total volume of household solid waste is composed of organic materials (ARIJ, 2006). Paper and cardboard make up to 7-19% of the

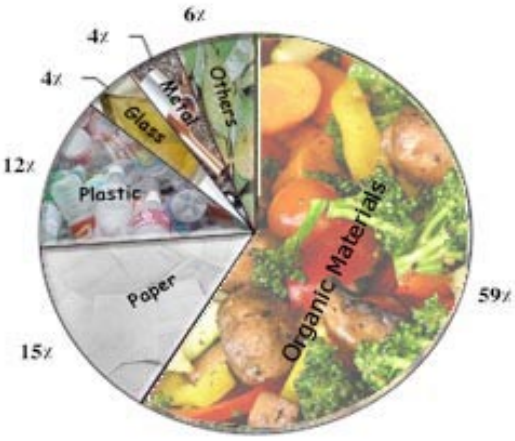


Figure 8.1: Organic materials make up nearly 60% of all household solid waste in the OPT

total solid waste in the West Bank, including only 1.5% in the Gaza Strip (ARIJ, 2006). Each of the other categories of solid waste represents less than 15% of the total solid waste (Figure 8.1). The high proportion of waste of organic origin suggests that an organized, regional composting program might be a highly effective method of reducing waste volume, with an added bonus of producing a valuable agricultural commodity. More over, at the household level Palestinian people should be encouraged to responsibly compost domestic waste, instead of dumping or land filling it.

In the Israeli settlements, organic materials make up a lesser percentage (43%) of the total solid waste (UNEP, 2003). By comparison, organic materials in Jordan make up 50-68% of the total volume of solid waste, and in the US, that proportion shrinks to 20-24% (UJRC, 2001; US EPA, 2003) (Table 8.2).

Table 8.2: Composition by volume of total solid waste stream in four countries

Country	(%) Organic Materials	(%) Paper / Cardboard	(%) Plastic	(%) Glass	(%) Metals	(%) Other
OPT	59	15	12	4	4	6
Jordan	50-68	5-10	4-6	2-5	3-6	>5
Israeli settlements	43	22	14	3	3	15
USA	24	35	11	5	8	17

Sources: ARIJ, 2006; UNEP, 2003; UJRC, 2001; US EPA, 2003.

ARIJ is testing and evaluating a new houshold garden composte. This composter converts the organic waste into an earthlike mass by means of bacteria and micro organisms. The compost created in this manner can be used for soil improvement in gardens; the compost contains important nutrients and promotes plant growth.

8.3.2 Collection and Disposal of Solid Waste

Dumping of solid waste in open, unmonitored sites throughout the OPT is the common method of waste management for the majority of localities in the OPT, especially in the West Bank. In 2005, one survey conducted by the PCBS counted 161 such dumping sites in the West Bank and 3 in the Gaza Strip, none of which were subject to any monitoring or control by the Palestinian Ministry of Health (PCBS, 2006) or other authorities. The extent of open dumping practices is closely linked to availability of collection services. For example, in 2005, 166 localities within the West Bank did not have any solid waste collection services at all (PCBS, 2005). This represents 27.8% of the total number of localities in that section of the OPT. In 78.5% of the localities, where a collection service was available, the local authority had jurisdiction over solid waste management. An additional 4.6% of localities had waste collection regimes, originating from the private sector (PCBS, 2005), and the rest used alternative regimes such as "Joint Councils for Services, Planning and Development" (JCspd). Through the JCspd of Dura (a town in the Hebron Governorate of the West Bank) and the JCspd of Jericho, 2 rehabilitated dumping sites were transformed into a sanitary landfill in 2003 and 2007 respectively, with immediately positive environmental results (ARIJ, 2005).

Photo 8.2: Random open dumping site in Beit 'Awwa, west of Hebron

Although, in the West Bank, the primary disposal method for solid waste is to simply dump it, the Gaza Strip possesses several donor-funded sanitary landfills of varying capacity and effectiveness. In central Gaza, the Jahr al-Dik landfill contains asyntheticliner and leachate collection system. Other landfills are built on impermeable ground outside the aquifer watershed (UNEP, 2003), which mitigates the need for lining on the bottom. One such landfill, in the Beit Hanoun area of north Gaza, was claimed by Israel in 2002 to pose unacceptable environmental risk, and has since then been shut down (UNEP, 2003; GTZ, 2006). Three sanitary landfills in Gaza (in Jahral-Dik, Deir al-Balah in central Gaza, and Rafah in southern Gaza) still operate to some extent (GTZ, 2006). Progress has been achieved in Gaza to a limited extent through the establishment of Regional Solid Waste Management Councils, which consolidate several problems that are common to every municipality (GTZ, 2005).

8.3.3 Analysis of Solid Waste Management's Options

Solid waste management's options range from the existing management practices to the introduction of several comprehensive schemes, comprising practical combinations of solid waste collection, transport, processing and/or reuse. Solid waste processing includes recycling, composting, incineration and landfilling.

The current regime of largely uncontrolled dumping is inexpensive, uncomplicated, and does not require a large investment in infrastructure. Moreover, it is a relatively a decentralized process that does not require an individual to wait for, or rely upon, centralized collection and disposal services. However, the environmental impacts of uncontrolled dumping sway the cost/benefit relation ship, in favor of finding a different, more hands-on approach to solid waste management. Likewise, uncontrolled incineration, a related approach that often coincides with uncontrolled dumping, can dramatically reduce solid waste volume. It also makes the garbage a less inviting target for bacteria, insects and small mammals. But the serious air pollution that the burning causes, both locally and globally, and the damage it does to waste collection infrastructure, dictates the need for a better strategy. Building sanitary landfills is the best solution. But due to space limitations, it is also advisable to attempt to reduce the volume of the waste stream as far as possible beforehand.

By building solid waste facilities for controlled incineration, authorities could potentially benefit from the advantages of burning solid waste, such as volume reduction and sanitization, and produce usable energy. In these incineration plants, emissions are filtered by using advanced scrubber devices. These devices use powdered lime to neutralize and transform SO_2 into gypsum and/or use biological agents to transform CO_2 into molecular oxygen. Simultaneously, the heat created by burning is harnessed to produce steam, to operate turbines, and to generate electricity, at least enough to power the energy-hungry scrubbers. However, such scrubbers produce solid or liquid sludge that poses its own hazardous waste disposal problems. The facilities, moreover, are expensive, logistically complicated, and require more political stability to implement than currently exists (ARIJ, 2005).

Two other waste volume reduction strategies (recycling and composting) have not been implemented to any significant degree at the national level in the OPT. This is despite their promise for not only reducing volume but also for conserving natural resources and saving energy used in manufacturing new goods. Pilot composting programs were started in conjunction with the landfill system in the Gaza Strip. They have been suspended due to damage caused to facilities by Israeli gun fire and the danger posed to workers in charge of these facilities (UNEP, 2003). Additional obstacles are presented by the unwillingness of residents on the individual and community level to allow composting plants to be built near them. The population of the OPT is very dense, and the prospects are slim for finding locations to build waste management facilities where no one objects. An NGO-based pilot composting project has been suspended in Bethlehem for similar reasons (UNEP, 2003).

Recycling, too, has not been institutionalized on a national level. There exists some capacity in Nablus for recycling of old cars and car wrecks (UNEP, 2003). Some instances of recycling occur within the private sector, such as return-of-deposit schemes on glass bottles. The success of these programs depend upon the willingness of consumers to participate and, more importantly, upon the initiative of the companies to arrange for pickup of items and set up channels for reimbursement of suppliers. Thus far, many companies have not invested in such activities. Because the industrial sector in the OPT is so small, a natural alternative could be, simply, to export recyclable material to Israel or Egypt. Both countries have already well-established recycling programs (UNEP, 2003). Such a program, of course, would be subject to Israeli approval and continued acquiescence.

8.4 Hazardous Waste

Hazardous waste is any waste that, because of its quantity or characteristics, may pose a threat to human health and/or the environment. Waste that exhibits specific characteristics of ignitability, corrosivity, reactivity, or toxicity must be managed as hazardous waste. Hazardous waste can be generated by chemical manufacturers, pharmaceutical companies, textile industries, mechanics, and hospitals. The waste generated by these businesses/institutions may exhibit one or more of the characteristics attributed to hazardous waste and thus promote safe management. Besides industrial and commercial waste, many household wastes are also hazardous.

As a result of a complete lack of hazardous waste management in the Occupied Palestinian Territory (OPT), there is little known as to the quantity and types of hazardous waste directly affecting the environment. There is nothing even approaching an accurate estimate as to the amount of hazardous waste generated by Palestinian industrial establishments, medical care centers and hospitals, as well as from the domestic and agricultural sectors. The amount of hazardous waste in the West Bank has been estimated at 2,500 tons/yr (EQA, 2002a), and the true amount is likely to be much higher.

8.4.1 Status of Hazardous Waste

8.4.1.1 Industrial Waste

Hazardous waste can be produced from different industrial activates in the OPT. According to the Palestinian Central Bureau of Statistics (PCBS), the total number of the industries in the West Bank and Gaza Strip was 6808 for the year 2004 (Table 8.3).

Table 8.3: Total number of industries in the West Bank and the Gaza Strip

Type of Industry	Total Number of Industries	
	West Bank	Gaza Strip
Food and beverages	1801	520
Textiles	218	51
Leather; Tanning bags	288	39
Wood and its products	282	290
Publishing, printing and reproduction	200	82
Rubber and plastic	87	70
Non-metallic products	1348	504
Chemicals	25	2
Basic Metals	16	7
Construction	329	375
Paints	8	3
Quarrying & stone cutting	209	2
Paper and its products	42	10
Total	**4853**	**1955**

Source: PCBS, 2004

In the OPT, industrial waste is managed together with municipal solid waste and, therefore, often mixed with non-hazardous materials. It may be taken to a designated dumping site via municipal solid waste collection, or alternatively dumped onto open land or into wadis adjacent to such facilities. Some waste is burned on-site, as is the case with most textile and packaging facilities, or is stored and later transferred to dumping sites. Most flammable waste is openly burned at its final disposal site. Thus, many potentially toxic materials (e.g. PVC) are burned, releasing emissions such as dioxins and furans into the atmosphere. Only a small amount of Industrial waste is recycled. Industrial wastewater, which may contain many hazardous substances, is typically disposed of via the wastewater network and, hence, ends up being discharged into the environment without any form of treatment.

Palestinian economical establishments produce approximately 82,000 tons of solid waste monthly, of which 54,800 tons are produced by industrial activities which contains hazardous solid waste (PCBS, 2006). The West Bank produces 61,900 tons, and 20,100 tons are produced in the Gaza Strip.

There are various processing methods for managing industrial solid waste. Existing industrial and economical establishments solid waste management practices are limited to collection and dumping in uncontrolled sites. Here, burning is the main type of disposal, mechanical and chemical treatments may also be applied (Table 8.4).

Table 8.4: Percentage of establishments by presence of solid waste treatment, and type of treatment

	Presence of solid waste treatment	Type of treatment				
		Open Burning	Buried	Chemical Treatment	Mechanical Treatment	Others
Economical Establishments *	**2.7 ****	**88.5**	**1.1**	**1.6**	**6.3**	**2.5**

** Economical establishments includes Industrial activities*
***2.7 % of the total number of the Economical establishments*
Source: PCBS 2006

Industrial wastewater contains different types of pollutants, most of which are hazardous to the environment. For example, industrial wastewater from the electroplating industry normally contains heavy metals such as chromium, copper and zinc.

Huge amounts of smoke, particulates, vapors and hazardous gases are generated and emitted into the air from certain industries in the West Bank. Some metal factories reuse motor oil as furnace fuel in the recycling of scrap metal. Furthermore, the pottery industry, mainly located in the Hebron Governorate, uses old tires as furnace fuel. The black smoke emitted from burnt tires is hazardous pollutant. At the same time, the production process for the charcoal industries, mainly in Jenin Governorate, burns large quantities of wood and straw.

The composition of industrial waste streams in the OPT is not known precisely, although some conclusions may be drawn by reviewing the types of industry and their potential waste (Table 8.5). Waste disposal options depend on constituent chemicals, and the physical characteristics of waste, as well as the quantities involved.

Table 8.5: Typical hazardous waste generated by the industries (ARIJ, 2007 and UNEP, 2002)

Waste Generators	Waste Type
Chemical manufacturers	Strong acids and bases Reactive wastes Ignitable wastes Discarded commercial chemical products
Vehicle maintenance shops	Paint wastes Ignitable wastes Spent solvents Acids and bases
Printing industry	Photography waste with heavy metals Heavy metal solutions Waste inks Spent solvents
Paper industry	Ignitable wastes Corrosive wastes Ink wastes including solvents and metals
Construction industry	Ignitable wastes Paint wastes Spent solvents Strong acids and bases
Cleaning agents and cosmetic manufacturing	Heavy metal dusts and sludges Ignitable wastes Solvents Strong acids and bases

Table 8.5 Continued

Furniture and wood manufacturing and refinishing	Ignitable wastes Spent solvents Paint wastes Nitrocellulose lacquer Thinner Panel cut offs Preservatives
Metal manufacturing	Paint wastes containing heavy metals Strong acids and bases Cyanide wastes Sludges containing heavy metals
Quarrying and stone cutting facilities	Particulates air born pollution Liquid and solid sludge (containing $CaCO_3$)
Charcoal industry	Carbon monoxide CO Carbon dioxide CO_2 Carcinogenic polycyclic aromatic hydrocarbons PAH's Nitrogen oxides (NOx)
Textiles	Organic colour Reactive dyestuffs Heavy metals
Olive mills	Liquid waste (Zebar) with high BOD,TSS concentration Solid waste (olive cake)
Tanneries	Sulphide emissions Decomposition of organic material Chromium Hexavalent chromium salts High salt content
Paint, varnish, adhesive and resin industries	Organic solvents such as ethyl benzene and halogenated aromatic hydrocarbons Acids Heavy metals (fungicides) Pigments Acrylates
Food processing	Solid and liquid organic effluent with high BOD Pesticides from washing fruit and vegetables Effluent highly saline
Shoe manufacturing	Ammonia compounds Arsenic Boric Phenol Chromium

8.4.1.2 Medical Waste

Medical waste comes in all forms, including solid, liquid and gas. It is generated from different health care facilities, including medical laboratories, medical research centers, human and veterinary pharmaceutical factories, as well as storage areas. It is characteristically heterogeneous, consisting of objects of various sizes and composed of many different materials. It can be divided into two categories, namely general waste and special waste. The general waste, forming approximately 80-85% of the total generated hospital waste, is defined as non-hazardous waste. It is to a large extent, can be considered similar to domestic waste, it includes food remnants, papers, cartons, metals, plastics and glass ware. This type of waste can be disposed of along with general municipal waste (WHO, 1994). The special waste is comprised of approximately 15-20% of the total hospital waste; 95% of this waste is considered hazardous waste. The special waste is predominantly generated in patient's wards, operating theaters, clinics, isolated units, and microbiology and pathology laboratories. In addition, waste from pharmacies, blood banks, dentist clinics and veterinarian laboratories are considered special and hazardous (WHO, 1994). In general, most health care centers and hospitals in the OPT have no separation processes between general and special wastes; all types of medical waste are mixed and in most cases disposed of with municipal garbage without treatment.

The monthly estimated quantity of solid waste produced by the health care centers in the OPT is about 426 tons, including 288 tons in the West Bank and 138 tons in the Gaza Strip. The total estimated quantity produced by the secondary health care centers in the OPT is about 121 tons (PCBS, environmental survey for health care centers, 2006).

According to the MOH report about Medical Waste management in the hospitals and clinics in the West Bank, the quantity of medical hazardous waste produced from hospitals and clinics in Ramallah governorate was estimated to 43.8 tons in 2002. These quantities was calculated depending on the WHO numbers; each bed produce 2 kg/bed/day and all the beds in the hospitals are 100% occupied and that 20% of all medical waste produced are considered hazardous waste. According to the same figures we can calculate the estimated amount of waste and hazardous waste generation in the hospitals in the OPT in 2005. As a result the total estimated quantities of hazardous solid waste produced from the hospitals are 456 tons per year in the West Bank and 328 tons per year in the Gaza Strip. Approximately 80% of the medical centers in the West Bank use uncontrolled methods for the disposal of their waste, such as dumping with the municipal waste or burning.

8.4.1.3 Special Waste

Special hazardous waste that is not directly linked with a type of industrial activity includes: Pesticides used in agriculture, polychlorinated biphenyls (PCBs) used in electrical installations, dioxins, asbestos used in building materials, household waste, used tyres and batteries waste. As an example, a total of 123 pesticides are currently used in the OPT, some of which are internationally banned or strictly regulated by the Stockholm Convention (EQA, 2003). Although the Palestinian Authority is not party to the Stockholm convention, the EQA's chemical regulations department prohibits the passage of internationally banned chemicals. Despite these regulations, illegal chemicals still find their way into the market. The total quantity of pesticides used is estimated at 730 tons in the West Bank (ARIJ, 2002b). In the Gaza Strip, more than 900 tons/yr of authorized pesticides are imported from Israel and used. On the other hand, over 100 tonnes per year of banned or restricted pesticides are sold and used by Palestinian farmers, entering the Gaza Strip through unauthorized channels (EQA, 2003).

8.5 Waste Management Practices in the Israeli Settlements

The Israeli settlements in the West Bank (including Jerusalem) generate a large amount of wastewater, thought to amount approximately 38 MCM in the year 2003 (Isaac et al., 2003). When comparing the wastewater generated by 480,000 Israeli settlers with that generated by the 2.5 million Palestinians living in the West Bank, which is 29 MCM, it is found that the settlers' wastewater generation is higher than that of the Palestinians. This can be attributed to the fact that they consume much more water for domestic purposes. The Israeli settler consumes, in average, 110 m^3/yr, while the Palestinian resident consumes around 20-30 m^3/yr of water (Analysis of Waste Management Policies in Palestine, 2005).

Wastewater from the Israeli settlements is either pumped to Israel over the Green Line, released into the Palestinian sewage system (e.g., Qiryat Arba settlement in Hebron area), or discharged directly into the land or a nearby wadi. Due to the fact that the Israeli settlements are located on hilltops, their wastewater often flows into lower lying Palestinian villages and agricultural land, damaging and poisoning crops, fouling water supplies and causing a public health hazard.

Several sewage treatment projects for the Israeli settlements are currently in various stages of implementation. A full data set on wastewater treatment by Israeli settlements is not available. However, a report by Friends of the Earth Middle East (2004) found that only 6% of the settlements adequately treat their sewage to a level that conforms to Israeli treatment standards. When completed they will treat a further 22% of the sewage, generated by the settlements, still leaving a significant 72%, discharging (inadequately treated or completely untreated) into the West Bank's environment. Moreover, currently, further Israeli settlement expansion is underway in the West Bank, with no consideration being given

to dealing with additional sewage generation. This will represent a severe threat to the Palestinian environment, besides being a violation of the Oslo Agreements and being illegal under international law.

It has been estimated that Israelis living in settlements in the West Bank produce an average of up to 2.21 kg/day/person of solid waste (UNEP, 2003). Up to 207 of these settlements collectively produce between 131,000 tons/yr (UNEP estimate, 2003) and 172,000 tons/yr (ARIJ estimate, 2005) of solid waste. Around 80% of the solid waste generated by Israeli settlements is dumped in sites throughout the Occupied West Bank. This figure doesn't include the significant quantity of solid waste, much of it hazardous, produced in Israeli industrial areas inside the West Bank.

Throughout the Israeli Occupation since 1967, Israeli policies have clearly ignored Palestinian interests. As an example, industries banned in Israel, due to their environmentally damaging potential, have been moved to the West Bank, where similar environmental laws do not exist. A manufacture of pesticides and fertilizers, previously in Kfar Saba (a town located in Israel), moved to an area near Tulkarm Governorate, utilizes dangerous chemicals (PLO, 1992).

Israeli settlements are also reported to release quantities of hazardous waste into the surrounding Palestinian environment without treatment. The Barqan industrial zone, located in Salfit Governorate of the West Bank, reportedly releases annually an estimated 810,000 cubic meters of industrial wastewater (ARIJ, 2001a), including hazardous waste. It is estimated that there are approximately 160 Israeli industrial facilities in the West Bank, including aluminum, tanning, battery, textile dyeing, plastics, food canning, and cement plants. All these industries are harmful to the environment and consequently to humans, if adequate waste treatment measures are not implemented. Map 8.4 shows the Israeli Industrial Settelments in the West Bank.

Israeli transgressions against legally binding environmental responsibilities can also be found in its burial of hazardous solid waste on Palestinian lands. According to the Palestinian Environmental Quality Authority (EQA) report in March, 2006, Israeli authorities are still smuggling solid waste and poisonous substances from industry inside Israel into the OPT, particularly into the southern part of the West Bank. The Israelis are also designating special waste disposal locations on Palestinian land. In 2005 there was an attempt to designate the Abu Shusha brick-breaker factory (near the Deir Sharaf village, northwest of the West Bank city of Nablus), as a waste disposal site. Furthermore, Israeli Occupation Forces (IOF) have used Palestinian lands for the burial of zinc, nickel, radioactive substances and industrial wastes for many years. There are also fears that Israel buried nuclear materials to the east of Yatta village. Other nuclear radiation concerns include Israeli nuclear experiments at Al-Aqaba Gulf area and the use of depleted Uranium during the Al-Aqsa Intifada 2000. (EQA, 2006)

It should be noted that the Israeli industrial activities in the OPT add further pressure on the Palestinian environment, as they do not apply the Israeli environmental law and dispose of the generated industrial waste without any treatment in nearby Palestinian lands.

It should be noted that the Israeli industrial activities in the OPT add further pressure on the Palestinian environment as they do not apply the Israeli environmental law and usually dispose of the generated industrial wastewater without any treatment in nearby Palestinian lands. The case of the Barqan Industrial Zone is a clear example of the potential threat to the Shared Israeli-Palestinian West Bank Aquifer.

The Israeli Industrial Zone of Barqan represents a "Hot Spot" of Pollution Overlying the Western Basin. In 1981, the Israeli Authorities established the Barqan residential settlement northwest of Salfit City on approximately 649 dunums (1 dunum=1000 meters) of land confiscated from the Palestinian village of Haris. There were around 1262 Israeli settlers residing in this settlement (ARIJ database, 2007). Within the same area, in 1982 the Israelis established the Barqan Industrial Park that occupies an area of 1417 dunums and is considered one of the large Israeli industrial Parks in the West Bank. The pollution potential of the uncontrolled disposal of toxic industrial wastes generated from the Barqan industrial zone over the highly sensitive recharge area of the Western Basin can result in predictable and real dangers. This issue should be dealt with urgently if the aquifer is to be protected for future generations from serious man made pollution. Consequently, an assessment of the impact of such zone was carried out in a collaborative study called, "Environmental Protection of the Shared Israeli-Palestinian West Bank Aquifer" between the Applied Research Institute-Jerusalem (ARIJ) and the Hebrew University-Jerusalem. It should be noted that the assessment was carried out by the Hebrew University-Jerusalem team.

In this study, the Western Basin was modeled as a two layer system. The combined MODFLOW and MT3D computer codes were used to study the anticipated effect of the continuous release of chloride source from the Barqan industrial zone on the spatial and temporal extent of ground water pollution in the Western Basin.

The assessment revealed that the first trace of chloride from the Barqan zone would reach the water supply wells pumping from the lower layer after 35 years from the date of the case study (1999). However, it would take more 45 years from the date of the case study until the chloride concentration would exceed 100 mg/l. Whereas, wells pumping from the upper aquifer an annual volume of 1.5 MCM are expected to experience the first trace of the pollutant from the Barqan source 40 years from the date of the study. The above time periods before the first trace of chloride reaches the water supply wells may appear long. However, it should be noted that this industrial park has been in operation since 1981, and the potential pollutants such as heavy metals, organic solvents and toxic substances are on their way to reach the groundwater with a damage that would be irreversible. Moreover, their permissible concentrations in drinking water are orders of magnitude lower than those of chloride.

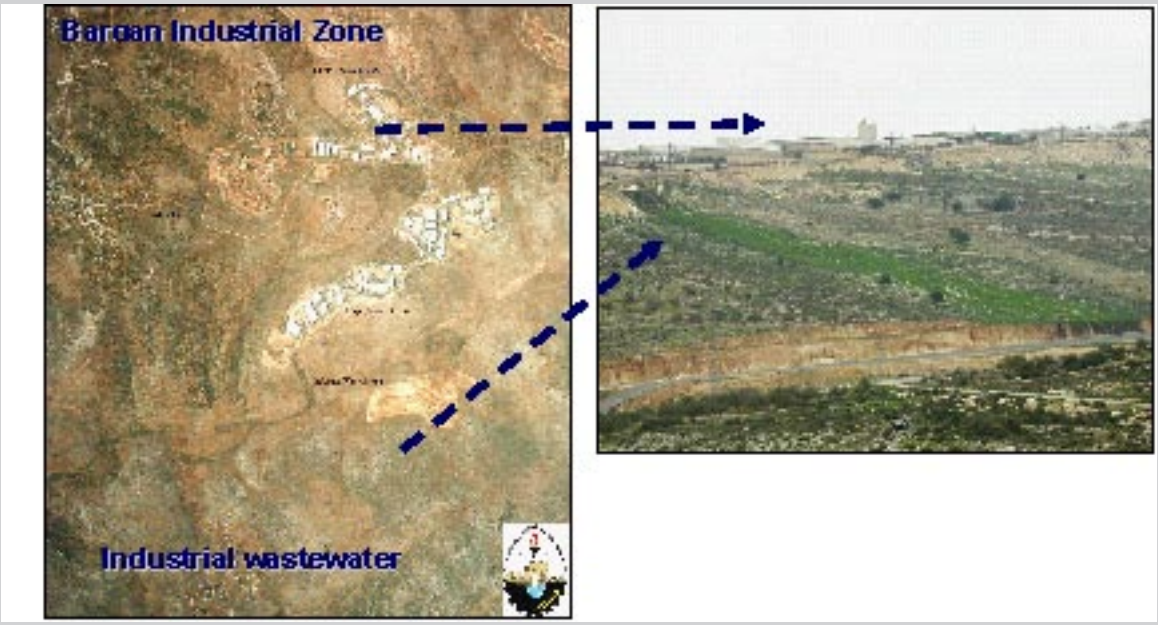


Photo 8.3: Wastewater Stream Flowing from Barqan Israeli Industrial Zone in Salfit Governorate (The generated industrial wastewater is discharged untreated into the nearby Palestinian Lands)

Map 8.4: Israeli Industrial Settlement in the West Bank

8.6 Impact of Waste on Environment

Failure to appropriately manage and dispose of waste can negatively affect the quality of the environment in many ways, as well as the people's quality of life, including the deterioration of ground water quality; air pollution; deterioration of nature and biodiversity; and landscape and aesthetic distortion of the visual environment.

The open discharge of solid waste and wastewater on the ecosystem pose great threats to the current and future quality of groundwater and may present several risks to human health. Due to the fact that the West Bank comprises the recharge zone of the West Bank's aquifer system, direct discharge of untreated or partially treated wastewater into open areas endangers the groundwater quality. In the Gaza Strip, the pollution of the aquifer will not directly affect Israel, but it has the potential to irreparably damage the only significant source of drinking water for close to 1.5 million Palestinians living there. Nitrate pollution in the Costal aquifer (in the Gaza Strip) is very common. In addition, pollution has been recorded at different locations in the West Bank (ARIJ, 2006).

The solid waste dumping sites are not covered or lined from the bottom to protect the groundwater and surface water. The precipitation that falls into the ground, coupled with any disposed liquid waste, results in the subsequent formation of leachate.

Pollution of the atmosphere and deterioration of air quality: The uncontrolled burning of solid waste in the open dumping emits acidifying and greenhouse gases (CH_4 and CO_2). The biological degradation of the remaining unburned organic waste adds to their emissions by generating landfill gases. Moreover, the burning of medical waste may pollute the air with various heavy metals, particularly cadmium and mercury, along with dioxins that form through burning Polyvinyl chloride (PVC) materials. Air pollution is associated with a variety of health problems, especially respiratory diseases and mortality.

Improper wastewater disposal impacts public health via several routes. Flooding of collection systems (cesspits, open channels, and pipelines) can cause spillage of raw sewage in residential areas, encouraging insect breeding (e.g. mosquitoes, etc.) and providing opportunities for the spread of pathogens. In addition, diseases (such as leishmaniasis) are spread by flourishing insect pollutions that breed in standing pools of untreated wastewater.

Approximately 80% of medical centers in the West Bank use uncontrolled methods for the disposal of their waste. Disposal of infectious waste is of serious concern as regards to the transmission of diseases, such as AIDS and Hepatitis B and C, which can be transmitted through infected syringe needles. People who are particularly exposed to the risk include medical care and sanitary workers, who work in the handling and transportation of such waste. In most cases, needles are dumped directly into the municipal waste that ends up at dumping sites.

Waste also causes soil pollution, raising salinity and heavy metal concentration. This leads to a drop in productivity (inflicting economic damage on farmers) as well as a drop in food security. In addition, waste management has a direct impact on problems related to deterioration of nature and biodiversity, as well as landscape and aesthetic distortion.

Palestinian Environmental Law no. (7)
Articles related to waste

Article (7): *The Ministry [of Environmental Affairs], in coordination with the specialized authorities, is to put a comprehensive plan for solid waste management in place at the national level, identify the sites and methods of waste disposal, and oversee the implementation of this plan by the local bodies.*
Article (8): *The respective specialized authorities are to be encouraged to take appropriate measures to tolerate the lowest level possible of solid waste production, and to re-use whatever can be re-used, or recover its components, or recycle it.*
Article (9): *The Ministry is to cooperate with the specialized authorities to identify the particular locations for the disposal of solid waste.*
Article (11): *the ministry in cooperation with the specialized agencies has to issue a list of the hazardous substances and wastes.*
Article (12): *prohibit the generation, use, storage, treatment or disposal of any solid, liquid or gaseous hazardous substances and/or wastes unless in accordance with the regulations specified by the ministry and the specialized agencies.*
Article (13): *(a) prohibit the import of hazardous wastes to Palestine; (b) prohibit the traffic of hazardous wastes across the Palestinian lands, regional wasters or economical zones without a permit from the ministry.*
Article (29): *the ministry in cooperation with the specialized agencies has to develop standards and regulations for the collection, treatment, disposal and reuse of wastewater and storm water in a manner that ensures environmental and public health protection.*

8.7 Outlook

Untreated waste, in addition to inadequate treated or partially treated waste, represents one of the greatest threats to the Palestinian environment. Fortunately, the severity of the threat has been recognized, and measurements have been taken to remediate it, both at the regional and local scales. However, since the outbreak of the Intifada in 2000, the waste management situation has worsened and implementation of development projects has become very problematic. A change in Israeli policy, especially regarding construction of the Segregation Wall, would be extremely beneficial for Palestinian attempts to improve the quality of waste management in the OPT. However, in the absence of substantive negotiations on the political level, Palestinians must act on their own to lessen the impact of these Israeli policies upon the waste management system as much as possible. Currently, the Palestinian government faces an externally-imposed fiscal crisis due to Israeli Occupation, Israeli withholding of Palestinian tax' revenue, and the international boycott on financial aid. There is virtually no prospect of improving services, or even maintaining the status quo, without a resumption of these funds. On most efforts, the OPT is in need of financial, logistical, and planning assistance from the international community.

Wastewater:

Large efforts have already been taken to improve the wastewater management in the OPT. However, still a large effort is needed to achieve an environmentally sound management. Therefore, projects and actions to be formulated should be related to the following:

Wastewater collection: There is an urgent need to construct a new wastewater collection network and to upgrade the existing one, in order to maximize household's connections coverage to sewage networks. Proper designing and management should be applied to the network and wastewater treatment plants, in order to assure sustainable wastewater collection.

Wastewater treatment and reuse: The objective of treating wastewater is not only to eliminate the pollution of the soil and groundwater resources, but also to make this wastewater represent a new water resource for agricultural irrigation. The Israeli control over Palestinian water resources in addition to the increasing population in the OPT, made wastewater treatment and reuse an urgent need specially that the reuse of treated wastewater can easily substitute the drinking water utilized for Irrigation, contributing in that way in the preservation of both the environment and water resources.

Administrative and institutional management: The sustainable development of the Palestinian water resources and wastewater will require improving the institutional, administrative, and legislative capabilities within the water and wastewater sector. This requires enhancing the capacity of the Palestinian staff working in this field.

Some supportive elements that should be considered while managing and planning regulations:

- Imposing restrictions and control measures on industries, in order to reduce the level of pollutants that enter the environment. Industries have to undertake on-site pretreatment to treat the generated industrial waste at source before disposal into collection networks.
- Establishing proper standards for Industrial effluents before discharge to the sewer system; and for treated wastewater that can be reused in irrigation or discharged directly over land or discharged to the sea.
- Full control and prohibition of illegal Israeli wastewater discharges to the OPT.

It is recommended that an integrated wastewater management approach be considered for a specific locality or cluster of localities. For instance, small scale projects in rural areas are less subject to derailing by unfavorable political conditions. Moreover, the small scale project can contribute very positively to the development of sustainable living for these communities and improve sanitary conditions at the same time. Reuse of wastewater for irrigation, both from small scale and from regional wastewater treatment plants, should form a vital component of Palestine's future water strategy. Those plants should be constructed with the purpose of treating water to acceptable effluent standards for reuse.

Solid waste:

The recent trend of decentralization is a positive one, whereby the "Joint Councils for Services, Planning and Development" have achieved successes in Hebron and Jericho towards regional management of collection and disposal of solid waste. Similar projects are ongoing in Jenin, Bethlehem, and most other regions of the OPT. In accordance with the Palestinian Environmental Law of 1999, the Environmental Quality Authority (EQA) should continue to encourage the formation of similar Joint Councils in areas that are still unorganized on the local level. Non-governmental organizations can also play a beneficial role.

The institution of recycling campaigns, at least on a limited level, could potentially be more successful at reducing sheer volume of solid waste and preserving energy and natural resources. There is not enough industry in the OPT to justify establishing a national recycling management system, such a system would entail educating residents to separate recyclable waste, creating separate collection routes and services; acquiring additional trucks, bins and staff, and building one or multiple recycling facilities.

At the very least, the Palestinian private manufacturing sector should be encouraged to launch policies on empty containers, such as glass and plastic bottles, which can be reused after the simple, minimal-energy process of washing them. Palestinian farmers should be encouraged to responsibly compost agricultural waste, instead of dumping or land filling it. Finally, the EQA should undertake the following four-pronged approach to combat littering and random dumping on the household level:

1- Pushing for legislation to impose fines on litterers and dumpers.

2- Setting a closure plan for each of the existing illegal dumping sites and stopping burning the garbage at the municipal dumping sites.
3- Commencing with a large public education campaign through television commercials, billboards and leaflets, advertising the new penalties and emphasizing the need for individual responsibility in preserving the cleanliness and safety of public space.
4- Acting through one of its implementing agencies, to make it easier for Palestinians to avoid littering. This can be done by increasing the number of public trash cans and dumpsters, which in some areas are nearly or completely absent, and by ensuring they are regularly emptied.

Hazardous Waste:
Neither the Palestinian Environmental Law #7 of 1999, in any of its relevant articles (11-13), nor the Palestinian Environmental Strategy addressed hazardous waste generation, treatment, or management except in a very short and minor fashion as a part of solid waste management. Neither did they address any matter related to a future direction towards waste minimization or waste recycling. The Palestinian Authority has to promote the establishment of facilities for eliminating the hazards of these wastes and recycling the bulk of hazardous wastes.

The Palestinian Authority should attach importance to the implementation of the following activities:

1. Establishment or adoption of a classification system for hazardous wastes. This will unify the definitions regarding name, nature, storage, handling, treatment and/or disposal of such wastes.

2. Establishment of a database through carrying out field surveys, for the quantity, quality, hazardous wastes generators, and on environmentally sound technologies for waste reduction and recycling, in order to further promote the prevention and reduction of the hazardous waste generation within the OPT.

3. Completing the hazardous waste management regulations.

4. Establishing and strengthening, as appropriate, procedures for environmental impact assessment.

5. Special medical waste, which needs special treatment, should be defined by qualified people according to WHO's standards.

6. Segregation of waste at source is a very important step. Each category of medical waste should be kept in different cloloured bags.

7. The Ministry of Health (MoH) needs to implement a monitoring system to control all disposal methods used in medical centers.

8. There should be discussion among specialists and decision makers, regarding technical, economic and institutional solutions, regarding the safe disposal of special medical waste.

9. Construction of a special landfill site for toxic and hazardous waste is recommended to dispose of ash generated from the incinerators.

Promoting and Strengthening International Capacities in Hazardous Waste Management: The OPT lacks the national capacity to handle and manage hazardous waste. This is due to many factors, including insufficient education and training programs, and deficiencies in regulatory frameworks. Accordingly, the Palestinian Authority should do the following:

1. Adopt regulatory measures for the environmentally sound management of hazardous waste, and establish an inventory list of specially controlled wastes.
2. Establish "Community Right-to-Know" to promote public awareness and information programs on hazardous waste. For each hazardous waste, information (such as quantities, nature, handling procedures, disposal, treatment and any other activities related to the environmentally sound management of such waste) should be publicly available.
3. Develop a network among professionals working in the area of hazardous wastes. Promoting and strengthening international cooperation in the management of transboundary movement of hazardous waste.

Promoting and Strengthening International Cooperation in the Management of Transboundary Movement of Hazardous Waste:

1. Establish citizen- watch programs to monitor local communities and to report any illegal or suspicious transfer or dumping of hazardous waste.

2. Promote the development of control procedures for the transboundary movement of hazardous waste.

3. Adopt the Basel Convention notification procedures.

4. Promote regional agreements to prohibit the transboundary of hazardous waste.

5. Reinforce national capacities to detect and halt any illegal attempt to introduce hazardous waste into the OPT.

6. Enforce a heavy penalty on the violators of illegal importers of hazardous waste.

Chapter Nine

Air Quality

9

9.1 Introduction

Air pollutants are liquid, solid, gaseous, radioactive, or microbial chemicals suspended in air due to the different human activities relating to industries, constructions, and means of transportation, or from the natural resources. However, such pollutants cause harmful effects to humans, animals, plants, buildings and establishments.

The Occupied Palestinian Territory (OPT) suffers from substantial air pollution, especially in the main urban areas and their vicinities. The increase in population, the expanding industrial activities, and the transboundary air pollutants are key factors to the deterioration of air quality in the OPT. The weakness of the executive authority and the affect of the Israeli Occupation have caused a weakness in enforcing the preventive legislation, codes and regulations to protect the environment, and have led to the heightening of the effect of human activities on air pollution. Climate and topography play a crucial role in transmitting air pollutants from one place to another.

The Applied Research Institute-Jerusalem (ARIJ) installed two air quality monitoring stations. The first was installed in the ARIJ building, north of Bethlehem and south of Jerusalem in August 2003; and the second was installed in the American Arab University of Jenin (AAUJ) in November 2005. Beside these two stations in the West Bank, there is also a new station in the Ministry of Transport in the Gaza Strip.

9.2 Sources of Air Pollution

ARIJ did an emission inventory in the West Bank; the structure of the green house gas inventory, following the order established in the "Revised-1996 IPCC Guidelines-Greenhouse Gas Inventory Workbook, Volume 2". Based on the 1999-data obtained from both ARIJ and the Palestinian Central Bureau of Statistics (PCBS), ARIJ calculated the following greenhouse gases: carbon dioxide (CO_2), carbon monoxide (CO), nitrogen oxides (NO_x), nitrous oxide (N_2O), Methane (CH_4), sulfur dioxide (SO_2), Ammonium (NH_4), non-methane volatile organic compounds (NMVOC), particulate matter of 10 micrometers or less in diameter (PM_{10}) (Table 9.1).

Table 9.1: Total emissions (ton) according to source of pollution in West Bank in 1999

	CO_2	CO	NO_x	N_2O	SO_2	NH_4	CH_4	NMVOC	PM_{10}
Economic sector	161,270	44	581	4	60	4		11	
Transportation	532,973	10,469	4,833	63	104	73		6991	
Electrical Generation	108,053	29	438	3	34	2		7	
Fuel Burning	348,742	2,017	1,244	10	226	85		138	
Agriculture	3,686	467	18	2,163			62		
Solid Waste	266,745		1,121		187	0	48,903		374

Source: Applied Research Institute-Jerusalem (ARIJ)

Figures (9.1-9.4) show some emissions in the West Bank. 38% of CO_2, 80% of CO, 59% of NO_x and 17% of SO_2 emissions were from the transportation sector. 24% of CO_2, 16% of CO, 15% of NO_x and 37% of SO_2 emissions were from fuel burning (industrial zones and heating in the winter). 19% of CO_2, 13.5% of NO_x and 30.5% of SO_2 were from solid waste burning.

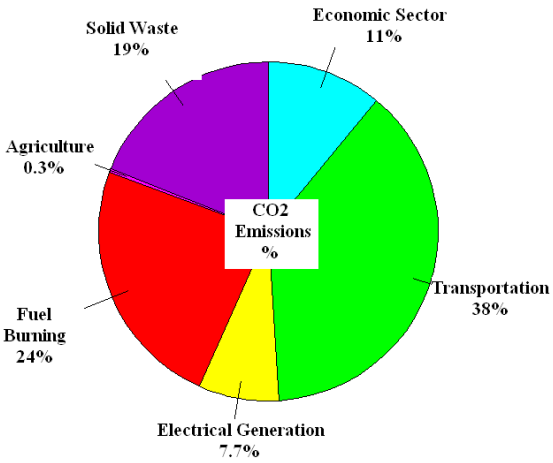


Figure 9.1: CO_2 Emissions (%)

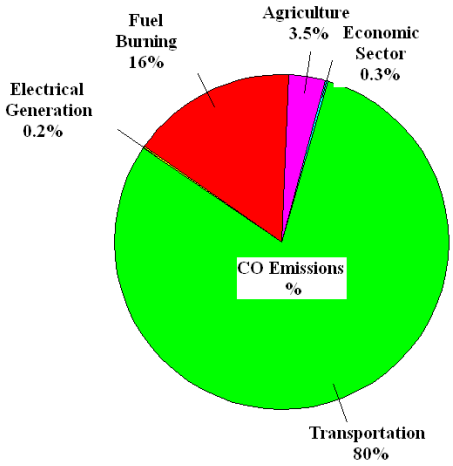


Figure 9.2: CO Emissions (%)

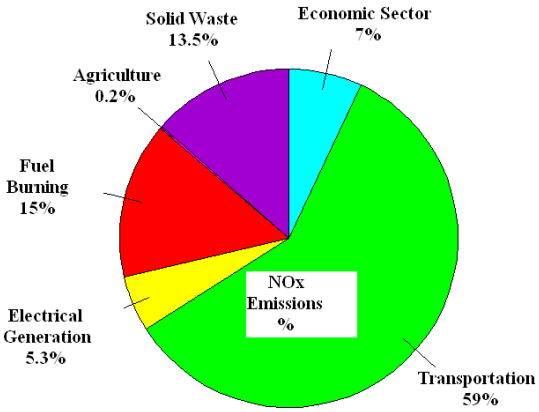


Figure 9.3: NO_x Emissions (%)

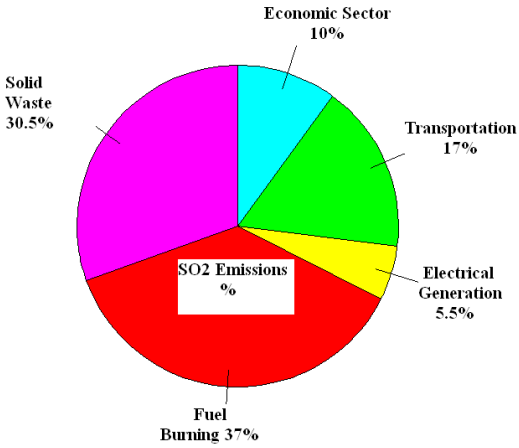


Figure 9.4: SO_2 Emissions (%)

9.3 Analysis of Air Pollutant Concentrations at ARIJ Station

Simultaneous measurements of photochemical air pollutants and meteorological parameters were carried out in the OPT, using air quality monitoring analyzers and a meteorological station. The analyzers measure carbon monoxide (CO), ozone (O_3), sulfur dioxide (SO_2), nitric oxide (NO), nitrous oxide (N_2O) and nitrogen oxides (NO_x). The meteorological station measures temperature, relative humidity, rainfall, wind direction, and wind speed.

Figure 9.5: ARIJ Air Quality Station in Bethlehem

The measurements were performed by ARIJ in Bethlehem, where the analyzers and the meteorological station are operating on a continuous basis (the location of the station is at the northern border of Bethlehem). Analysis of the observed concentrations of all measured pollutants had revealed the following:

a. SO_2 concentrations vary between the hours of the day. Higher values were recorded around 8 am and 6 pm.

b. Low averages of CO concentration vary from 0.4 to 1.3 ppm during the hours of the day in the year 2004. The highest averages were recorded around 8 am and 8 pm.

c. By comparing the monthly CO average concentration, high averages were recorded in February and March, while the lowest average was recorded in July. Seasonal differences (high averages in the winter and low averages in the summer) were also observed.

d. Low averages of O_3 concentration during the hours of the day in the year 2004 were recorded. The highest averages were recorded around 3 pm and lowest averages were recorded around 8 am and 9 pm.

e. By comparing the monthly O_3 average concentration, a continuous increasing during the year was observed. The lowest average was recorded in January, while the highest averages were recorded in the last 3 months of the year 2004.

f. Two high average concentrations of NO, NO_2 and NO_x during the hours of the day in 2004 were recorded around 8 am and 8 pm. The low averages were recorded around 4 am. Also, the concentrations of NO were very low to be approximately zero for the period of 11 pm - 5 am (Figure 9.6).

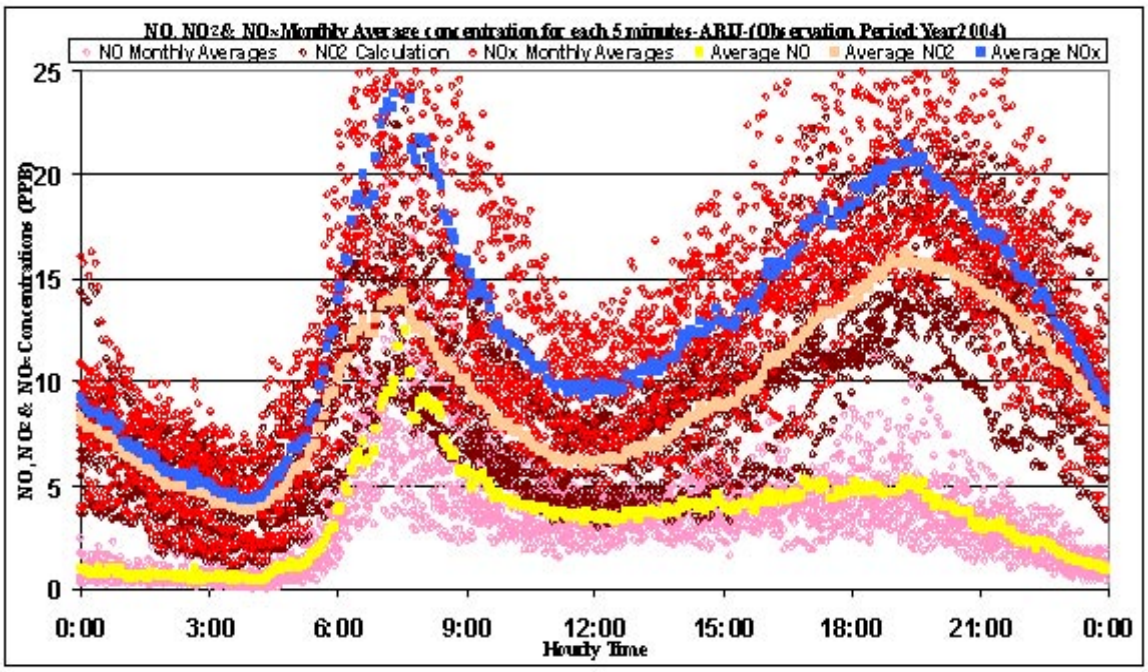


Figure 9.6: NO, NO2 and NOx monthly average concentrations in 2004 (ARIJ)

g. By comparing the monthly NO and NO_x average concentrations, a continuous increasing trend, except for November was noticed. The lowest average concentration was recorded in January, and the highest average concentrations were recorded in September and October. Also a difference between the NO_x and NO average concentrations was clear, indicating that the source of pollution was far from the ARIJ station.

h. According to the days of the week analysis (Figure 9.7), there were significant differences, Saturday and Friday were the lowest days of pollution, which might suggest that the source of pollution is from Israel, since the two days are the weekend in Israel, while the Friday and Sunday are the weekend in Bethlehem (Saturday is the busiest day in this city).

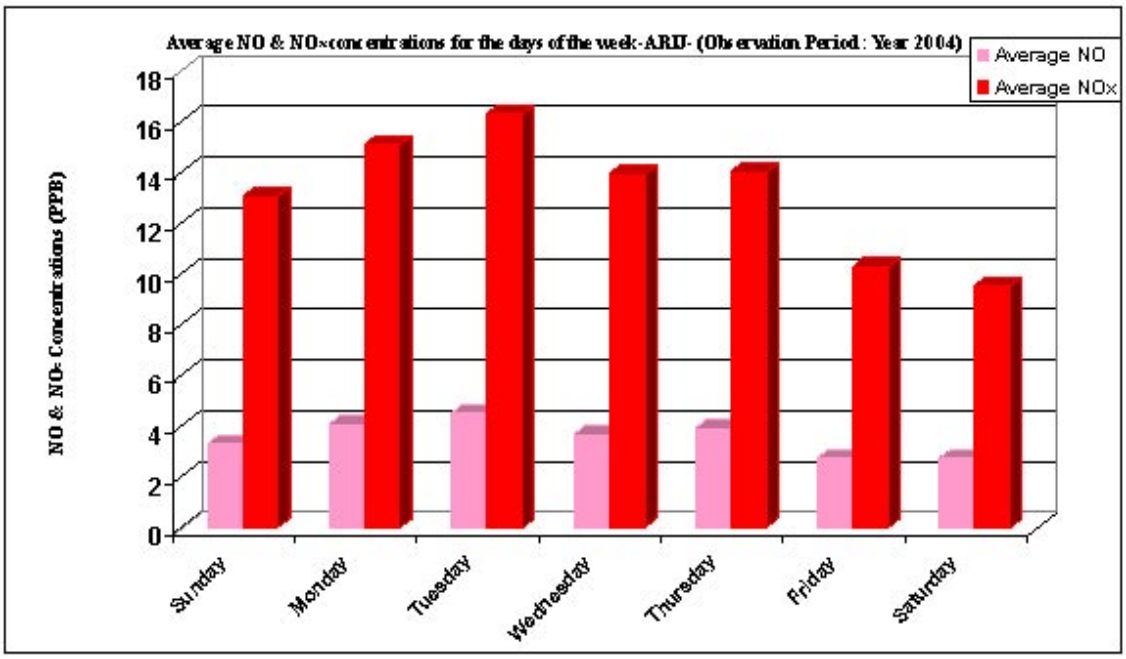


Figure 9.7: NO & NO_x average concentrations during days of the week

i. Figures 9.8 and 9.9 show that the highest concentrations of O_3 and NO_x come from the west, due to the wind direction (WD).

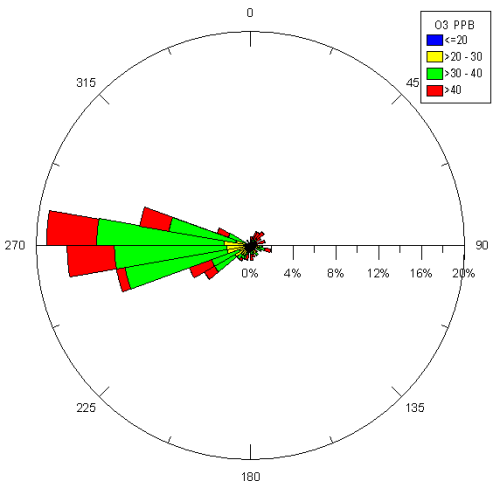


Figure 9.8

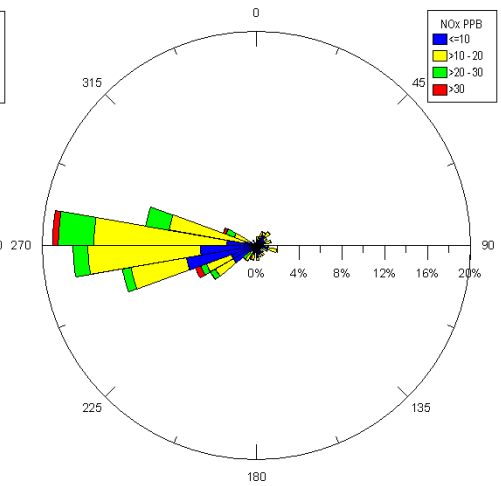


Figure 9.9

Figure 9.8: Daily average O_3 concentration in 2004, classified according to WD at ARIJ.
Figure 9.9: Daily average NO_x concentration in 2004, classified according to WD at ARIJ.

9.4 Analysis of Air Pollutant Concentrations at AAUJ

The second air quality and meteorological station was installed at AAUJ. This station observes the pollutant concentrations and meteorological measurements in the Jenin region, north of the West Bank.

Pollutants' analysis for the AAUJ station for the month of January 2006 showed the following:

a. The averages of SO_2 concentrations vary between zero and 18 ppb, and the average value is about 2 ppb. Higher values were observed in the day time more than in the night time.

b. The averages of ozone concentrations differ according to the day hours, where higher by averages were recorded around 4 am.

c. The averages of NO concentrations are approximately zero for the period of 6 pm - 9 am.

d. The averages of NO_x concentrations are higher than those of NO averages. The high averages were recorded from 9 am to 9 pm.

e. The averages of CO concentrations are between 0.5 and 0.6 ppm with no differences during the hours of the day.

f. Figure 9.10 shows the averages of NO, NO_2, NO_x and O_3 concentrations and the differences between them. These differences can be attributed to the source of pollution. The NO concentrations are near zero for the period of 6 pm - 9 am, indicating that the source of pollution was far from the station.

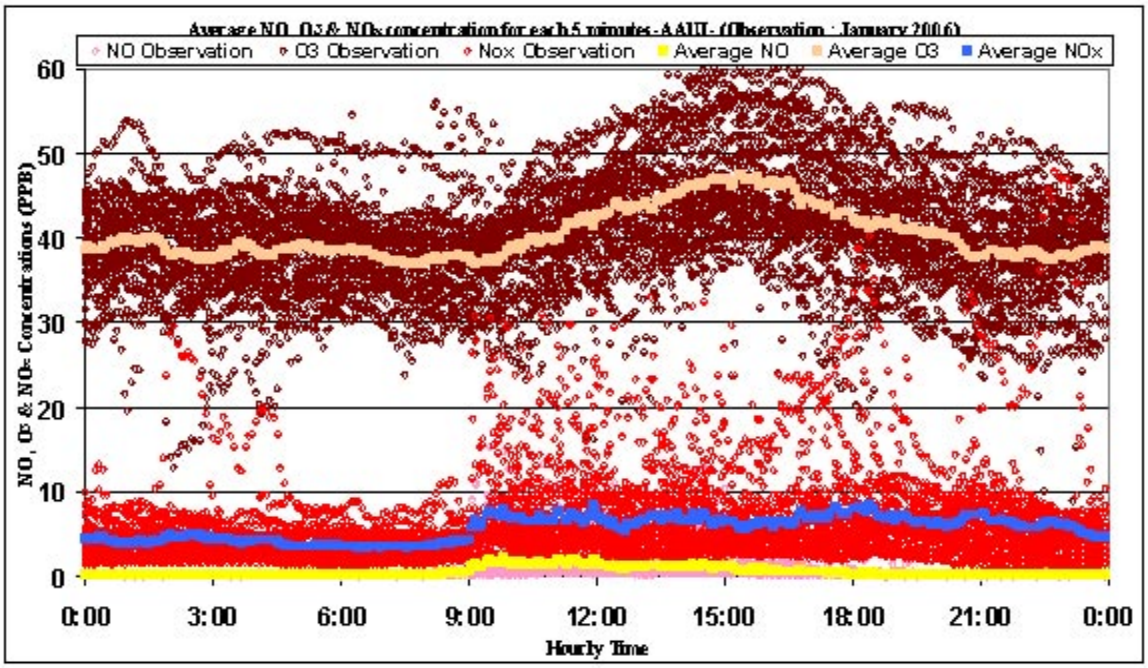


Figure 9.10 Averages of NO, NO_2, NO_x, and O_3 concentrations (AAUJ)

9.5 Transboundary Air Pollution

Air pollution is not limited by political and geographical boundaries and therefore, air emissions in Israel may greatly impact the air quality of the OPT, especially since the westerly winds help in carrying pollutants from Israel towards the OPT. Thus, it is important to mention that Israel should take the responsibility of air pollution's problems in the OPT. The contributions to air pollution originated in Israel are very different from those originated in the West Bank. This is due to the fact that Israel has a large industrial base and more vehicles, which thereby increase the deterioration of air quality. The dense vehicular traffic in Israel is a major contributor to air pollution, emitting greater amounts of NO_x, CO, CO_2, Pb, and SO_x, as well as particulate matters, especially in the heavily populated urban centers and major cities, such as Tel Aviv. These Israeli pollutants end in the OPT due to the wind effect from west to east.

9.6 Noise Pollution

Noise is unwanted sound in the form of energy, measured in decibels (dB). It is the output of urbanization and industrialization. Noise is increasingly recognized as an environmental pollution, affecting human health. The impact of various noise levels are reflected in human physiology, communication, performance and social behavior. Over time, noise can become a significant nuisance, disturbing the normal daily activities of people. Noise pollution has never been studied in the OPT, because data on noise pollution's levels are not available. However, field observations can give an idea about the various sources and levels of noise in the area.

Sources of noise pollution in the OPT are mainly traffic and motor vehicles, construction of roads and buildings, and industrial activities. This is in addition to the noise pollution, resulting from Israeli military aircraft and military training activities. When noise pollution reaches more than 140 dB, it has a clear impact on humans, causing damage to the nervous system and the hearing, and increasing the blood pressure. Also noise impacts people's ability to sleep, to concentrate and to communicate. It also affects wildlife and its habitats.

9.7 Outlook

There is lack of official standards or maximum acceptable levels for air pollutants in the OPT. Therefore, it is very important that the authorities concerned should establish national standards for air pollutants. Legislations and laws to protect the environment have been established, and these laws need to be active. Establishing an environmental police to monitor and enforce the laws and standards is very important and highly recommended.

There are two air quality monitoring stations installed by ARIJ. The ARIJ first station was installed at the ARIJ building (Bethlehem Governorate), and the second station was installed at the AAUJ (Jenin Governorate). Also there is a new station in the Ministry of Transport in the Gaza Strip. Other air and noise monitoring stations should be established at different locations in the OPT.

Since transport and the industrial activities are the major contributor to air pollution, the following measures should be introduced to reduce its effect:

- Annual vehicle inspection should include air emissions.
- Old vehicles, including buses, trucks, taxis and private cars, which are unable to meet the emission standards, should be taken out of service.
- The use of unleaded gasoline should be encouraged to reduce the amount of lead emitted to the air. Emission requirements should be established for motor vehicles.
- Looking for alternatives of gasoline and diesel engines to use for vehicles to reduce emissions, such as liquefied petroleum gas (LPG) engines.
- Regulate the dust emission from quarries, and take actions against dust producing facilities.
- The use of old tires or used motor oil, as a source of energy in bakeries and pottery industry or other type of industry, should be prohibited. This is due to the fact that huge amounts of green-house gases, such as carbon monoxide and carbon dioxide, are emitted.

In regard to the noise pollution, the following steps should be taken into consideration:

- In the urban areas, traffic should be managed to reduce noise. Road and building construction should be done at certain times and in a manner that reduces noise and disturbance as much as possible. Nuisance noise, such as music shops playing music loudly into the streets, should be better controlled.

- Buildings should be designed to reduce incoming noise pollution. Double-paned glass can be used, which will reduce the sound intensity by about 40 dB.

- Noise pollution, coming from vehicles and stationary sources, should be limited. Vehicles should be required to have a functioning exhaust system. Industry noise should be regulated to protect those moving outside, as well as workers within the plant.

Chapter Ten

Biodiversity

10

10.1 FLORA & FAUNA

10.1.1 Introduction

Mandate Palestine lies at a bio-geographic crossroads between the European, Asian and African continents, the Mediterranean and Red Seas, and a number of botanical zones. This bio-geographic convergence is reflected in the region's high biodiversity value. As well as a center of wild plant biodiversity, the region is also an historic center of crop diversity and cultivation. The life-sustaining crops such as wheat, barley, vines, olives, onions, and pulses, all originated within the geographical land of Mandate Palestine. The wild ancestors of these crops, which now only occur in tiny remnants of natural vegetation, represent a vital resource for future crop breeding (Hepper, 1992). Mandate Palestine also shares with Jordan and Syria one of the Earth's major geological and bio-geographical features. This is the great Rift Valley, which stretches to eastern Africa and which is currently the subject of international discussion on its potential nomination as a serial World-Heritage Site.

The natural ecosystems in Mandate Palestine provide support for human activities in agriculture, animal husbandry, forestry, traditional and pharmaceutical health products, tourism, and many others. These systems are essential also for their aesthetic and intrinsic value, and for the stabilizing effect of the ecosystems and the protection of overall environmental quality. Sustainability of agricultural production and environmental balance depends on the status of a diverse natural biota.

There are about 51,000 living species in Mandate Palestine. About 47,000 (92%) species are known, or thought to be known and another 4,000 (8%) are species that are assumed to be found or identified in the future. Heywood and Watson (1995) listed some 1,750,000 living described species, based on several sources, as the total global biodiversity. By this account, Mandate Palestine's biodiversity (including viruses) comprises about 3% of the global biodiversity. Such rich biota is composed of an estimated 2,750 species of plants in 138 families (Danin, 2004). These include 60 species of natural trees and 90 species of bushes distributed all over Mandate Palestine. They encountered 149 endemic plants that do not exist in other places in the world (ARIJ, 1997; Ishtayia, 1995).

As in so many countries, the biodiversity in Mandate Palestine is threatened by human activities. Natural ecosystems are destroyed to make way for agricultural, industrial, or housing developments; and growing population pressure has led to unsustainable utilization of natural resources and pollution of the environment. However, due to the belligerent military Occupation, environmental management in (OPT) is complicated and hampered. Furthermore, Israeli Colonization policies have added to population pressure, as settlements continue to grow in the Occupied West Bank. Straining of natural resources, environmental pollution, and the construction of settlements, the bypass roads, and the Segregation Wall have all created further land fragmentation and ecosystem destruction. Thus, the Israeli Occupation (of the West Bank, including East Jerusalem, and the Gaza Strip) amplifies and exacerbates existing environmental problems, and hampers and impedes efforts to ameliorate them. If steps are not taken to overcome this problem, environmental degradation will continue and worsen in the Occupied Palestinian Territory (OPT) and as a result many unique species may be lost.

10.1.2 Plant Diversity in the OPT

10.1.2.1 Distribution of Major Plant Families

The vegetation cover in the OPT consists of a variety of plant formations, ranging from dense forests to thin patches of desert herbs, passing through different forms of woodland, such as maquis, garrigue and

batha. The OPT is comprised of five main agro-ecological zones: the Jordan Valley, the Eastern Slopes, the Central Highlands and the Semi-coastal Plain (West Bank), and the Coastal Plain (Gaza Strip). Climate varies abruptly between these different zones, despite their small geographic area. And so, flora and fauna vary accordingly, although there is also a good deal of overlap in species distributions between the different zones. The areas of greatest plant diversity are the Central Highlands and the Coastal Plain. The presence of such a variable plant formation of trees, shrubs, and herbs, which survive in different environmental conditions, indicates the diverse genetic background that they possess.

There are 93 major forests in the West Bank and 13 in the Gaza Strip, covering about 230 km² and 2 km², respectively. Forests cover approximately 4 % of the total area of the West Bank and 0.6 % of the Gaza Strip. In addition, the total area of nature reserves in the West Bank and Gaza Strip is about 774 km², forming 12.8% of the total area of the West Bank and the Gaza Strip.

The West Bank and the Gaza Strip contain 2076 species of plants (ARIJ, 2006). 1959 species (in 115 families) are growing in the West Bank and 1290 species (in 105 families) are growing in the Gaza Strip. The most dominant families in both areas are the Papilionaceae, Compositae and Graminae (Figure 10.1). The families' composition and distribution differ from one geographical area to another, since the ecosystems are different.

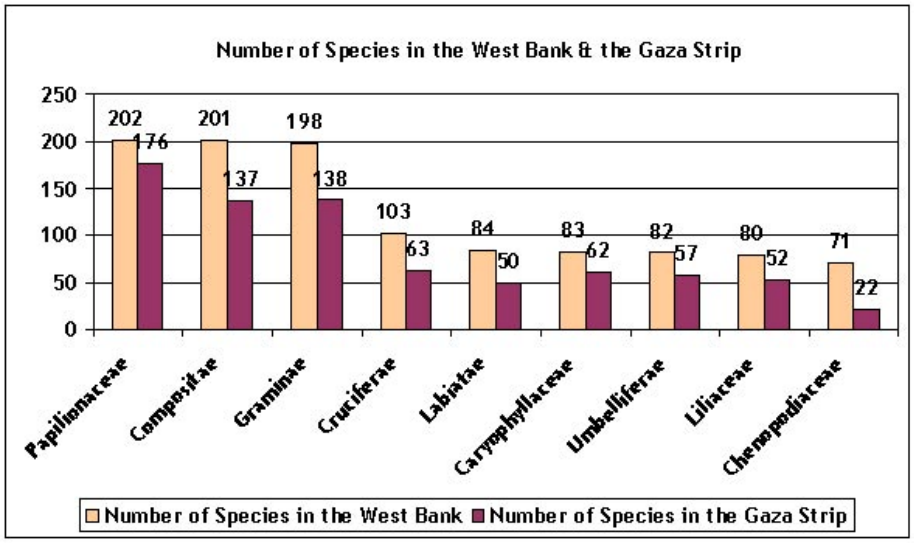


Figure 10.1: Dominant families and their species inhabiting the West Bank and the Gaza Strip

There are 16 families that grow in the West Bank but not in the Gaza Strip, such as Pinaceae, Lauraceae, Cynomoriaceae, Plantanaceae, Moringaceae, Menispermaceae, and others. There are also 5 families that grow in the Gaza Strip but not in the West Bank, including Hydrocharitaceae, Ophioglossaceae, Nymphaeaceae, Lentibulariaceae, and Callitrichaceae. Examples of common plants in the West Bank and the Gaza Strip are: *Pistacia palaestina, Olea europea, Quercus calliprinos, Pinus halapensis, Anemone coronaria, Artemisia herba alba, Calendula arvensis, Chrysanthemum coronarium, Avena sterilis, Adonis cupaniana (Photo 10.1).*

Photo 10.1: Quercus calliprinos

10.1.2.2 Endemic Flora

There are 102 endemic species (in 28 families), forming 5% of the total species, of which 12% are rare endemic species. Up to 92 endemic species (in 26 families) are growing in the West Bank, forming 4.7% of the total species, and 30 endemic species (in 18 families) are growing in the Gaza Strip, forming 2.3% of the total species. Most of the endemic species growing in the West Bank belong to Compositae family that constitutes 12.8% of total endemics. Most of the endemic species growing in the Gaza Strip belong to the Papilionaceae family (13.3%). Examples of the endemic species growing in the West Bank are *Capparis spinosa* (Capparaceae), *Suaeda palaestina* (Chenopodiaceae), *Origanum dayi* (Labiatae), and others. Examples of endemic species growing in the Gaza Strip are *Erodium subintegrifolium* (Geraniaceae), *Iris atropurpurea* (Iridaceae), *Paronychia palaestina* (Caryophyllaceae), and others, (Zohary and Michael, 1966, 1972, 1978, 1986; Feinbrun-Dothan, Avinoam, 1991; Shmida, 2006).

10.1.3 Diversity of Fauna in the OPT

As a result of its geographical position, the OPT has a vast variety of wildlife. There are an estimated 30,904 species (PCBS, 2005; ARIJ, 2006), of which 30,000 invertebrates, 427 birds, 297 fish, 92 mammals, 81 reptiles and 7 amphibians (PCBS, 2005; ARIJ, 2006). Mainly, the Palestinian Fauna is considered vagile, as it is hard to confine a species to be restricted to a particular locality within the OPT. Thus, they are categorized to a greater extent to different zoogeographical regions on the basis of their origin and distribution, being contingent upon suitable substrates and habitats. The main zoogeographic origins of Palestinian mammals are Palaearctic, Palaeotropic, and Cosmopolitan.

10.1.3.1 Avifauna

The position of Historical Palestine, and its varied ecosystems and climate result in relatively high bird diversity. More than 510 bird species have been recorded in Historical Palestine, by which 427 species have been stated to occur within the West Bank and the Gaza Strip. They belong to 193 genera, classified within 68 families and 24 orders. The largest family in the OPT is Sylviidae, with 59 species and subspecies (ARIJ, 2006). Birds are further classified into 5 groups, based on their seasonal behavior. These groups are residents, winter visitors, summer visitors, migrants, and vagrants. Some species may be represented in more than one of these groups, such as the Lesser Kestrel (*Falco naumanni*).

The resident birds live all year round and breed in the OPT. A total of about 88 species resides in the West Bank and the Gaza Strip, including House Sparrow (*Passer domesticus biblicus*), Golden Eagle (*Aquila chrysaetos homeyeri*), and Palestinian Sunbird (*Nectarinia osea osea)*. The wintering birds (about 207 species), arriving in the West Bank and the Gaza Strip mainly from Europe and central and northern Asia, stay only for winter and then migrate elsewhere to breed. Summer birds comprise about 73 species in the OPT. They nest and breed in spring and summer but migrate back to their wintering territories in fall. They include Olivaceous Warbler (*Hippolais pallida elaeica*), the Swift (*Apus apus apus*), and Sooty Falcon (*Falco concolor*) (Hadoram Shirihai, 1996).

The migrant birds, on the other hand, are birds that pass over or stop in the OPT only to rest and feed, and then follow their usual migrant destination. About 274 species migrate through/over the West Bank and the Gaza Strip, during their migration seasons (August-November and March-May). Honey Buzzard (*Pernis apivorus*) is an abundant diurnal passage migrant over most parts of the OPT. The OPT also hosts around 130 vagrants, where about 73 species have been recorded to come to the OPT accidentally and at irregular intervals. Major examples of these vagrants are Rustic Bunting (*Emberiza rustica rustica*), Cape Verde Petrel (*Pterodroma feae*), and Red-Billed Tropicbird (*Phaethon aethereus indicus)*.

10.1.3.2 Mammals

Mammals in the OPT represent the second largest class after birds. So far, 92 terrestrial species have been recorded in Historical Palestine, belonging to 7 orders. These include Insectivora (3 families), Chiroptera (8 families), Carnivora (5 families), Hyracoidea (1 family), Artiodactyla (3 families), Lagomorpha (1 family), and Rodentia (7 families) (Mendelssohn & Yom-Tov, 1999).

10.1.3.3 Herpetofauna

Amphibians and reptiles make up an important component of the Palestinian ecosystem. Most of the Palestinian Herpetofauna are of Mediterranean or Saharo-Arabian zoo-geographic origin. In the OPT, the amphibians are represented by 2 species, belonging to the order Urodela, and 5 species, belonging to the order Anura. Recently, the Amphibian population has been decreasing as a result of habitat loss, particularly swamp drainage. Reptiles have scaly skins and have no need for water for breeding. They are represented in the OPT by 81 species classified into three orders: Testudines (turtles), Sauria (lizards), and Ophidia (snakes) (Photo 10.2).

Photo 10.2: Testudo graeca

10.1.3.4 Invertebrates

The invert-fauna of Historical Palestine is very diverse in its forms and colours. Unfortunately, very few studies on invertebrates in Historical Palestine have been conducted. However, around 30,000 species of invertebrates have been estimated to occur in Historical Palestine. Invertebrates vary from simple organisms, such as sponges and flatworms to complex animals, such as Arthropods and Mollusks. These diverse fauna of worms, butterflies, beetles, bees, ants, spiders and snails are considered of great direct or indirect importance to the ecosystem. Some are part of the food chain to other living organisms or an agent in different biotic processes.

Snails and slugs are widespread all through the OPT. They fall under the class Gastropoda, comprising about 100 species. Another common species are the spiders and scorpions, which are represented by the class Chelicerata. Examples include the most venomous scorpion, Palestine yellow scorpion (*Leiurus quinquestriatus*), and *Chaetopelma aegyptiaca* (one of the biggest spiders). Some other classes of species that are widespread over the OPT and can be seen by the unaided eye are Diplopoda (Millipedes), Chilopoda (Centipedes), Malacostraca (Pill bugs, slaters and woodlice), Oligochaetes (Earthworms), and Hirudineans (Leeches).

10.1.3.5 Fish

A total of 297 species of fish share recorded in the OPT. Of these, 12 freshwater species have been stated to occur in the River Jordan and inland water-bodies. 16 fish species from the Red Sea have been found in the Mediterranean Sea after migrating through the Suez Canal, and around 186 species of Mediterranean origin (PCBS, 2005). These fishes belong to around 22 orders of the classes Actinopterygii (Ray-finned fish) and Elasmobranchii (skates, rays and sharks). The largest order is the Perciformes, which comprises fish of both marine and fresh water.

10.1.3.6 Introduced Species

A reintroduction program provided by the Israeli Nature Reserve Authority was set up to reintroduce some of the wild locally extinct species of Historical Palestine. These include the Fallow Deer (*Dama dama mesopotamica*), Roe Deer (*Capreolus capreolus*), the Wild Goat (*Capra hircus*), and the Arabian Oryx (*Oryx leucoryx*) and the Onager Wild Ass (*Equus hemionus*). A new family, Capromyidae, of the species Coypu (*Myocastor coypu*) was introduced to Historical Palestine during the 1950s (Mendelssohn & Yom-Tov, 1999).

10.1.4 Pressures on Biodiversity in the OPT

Sovereignty over natural resources is one of the key elements for any nation to achieve sustainable development and sound environmental management. The case of Palestine is different than other nations as it passes from occupation to liberation over different periods and phases. Without the ability to regulate land use over a contiguous piece of land, natural ecosystems can not be maintained, the status of the environment can not be properly monitored, and environmental protection can not be implemented. The existence of accessible and inaccessible areas for Palestinians made the management and conservation of natural resources a very difficult job. The plans of the Israeli Authority (the controlling power in the area), have systematically hindered the development of the Palestinian society and have also damaged the Palestinian environment. All these practices have created a geographical discontinuity at the lands

of the OPT. This discontinuity has resulted in a major physical impediment towards accomplishing sustainable development in the OPT.

During the Israeli Occupation, several laws have been issued for the protection of natural resources. However, those laws implemented in the OPT gave Israel the full control over Palestinian natural resources, mainly land for security reasons, as Israel claims. The outcome of Israeli laws that were passed for the Occupied West Bank could be assessed from the huge area of land that has been confiscated. Due to such policies and military regulations, there has been an increased rate of destruction, loss of green areas, and reduced biodiversity in the Palestinian ecosystem. In addition to the closure of grazing areas, several military bases have been established, causing changes in the topography, natural stream flow routings, and increased soil erosion (Map 10.1).

Biodiversity is under threat from a variety of pressures, which are further worsened by the ongoing conflict. During times of the ongoing conflict, focus has been shifted away from sustainable management of natural resources and nature protection to other issues. Generally speaking, biodiversity is under a serious threat due to human activities, disrupting the ecosystem of the land. Common species are under a serious threat of becoming rare, and rare species are disappearing altogether. Habitats are getting fragmented resulting in a serious loss of biodiversity. Another possible yet realistic danger is the viability of species. Fragmentation of habitats and the seclusion of species, mainly as a result of the Israeli segregation walls and settlements, are definitely affecting genetic exchange.

Of all global problems, it is widely believed that species' extinction can have the most serious consequences - and it is irreversible. The problem is especially acute in Historical Palestine. This is due to the fact that the country's limited size, momentum of development, population growth and other reasons have made the protection of precious natural resources and open space landscapes especially difficult.

Plant species in the OPT are becoming increasingly rare, due to the ongoing destruction of their natural habitat, the over-harvesting of wild species, and the detrimental climatic and environmental changes. The plant genetic resources of the OPT are constantly declining over the years. Of the surveyed 2076 plant species growing in the OPT, it was recorded in local literatures that 636 species are listed as endangered, of which 90 species are very rare. It is also contended by experts that urgent conservation measures are required for more than 40 species (Sultan, 2001).

It was also found, through a survey done by ARIJ, in 2006, that during the last 30 years, 370 species have changed their status to become rare or very rare in the OPT (Figure 10.2). On the other hand, around 22 terrestrial animal species are under the threat of extinction. They include 5 species of mammals, 5 species of Herpetofauna, and 12 species of birds (PCBS, 2005). Also, around 56 Mediterranean fish species (26% of the total fish Fauna of the Gaza Strip) are considered to be threatened (Ali, 2002). As a result, it is predicted that in the OPT, a number of species will disappear within the next 10 years, unless urgent measures are taken to protect, preserve, and develop their utilization. Degradation of plants' ecosystem in the OPT threatens the existence of Fauna. On the other hand, fragmentation of the landscape disrupts migration and genetic contiguity, and threatens the viability of populations. So, the main threats to the Palestinian Fauna are the anthropogenic pressures on plants, animals and ecosystem.

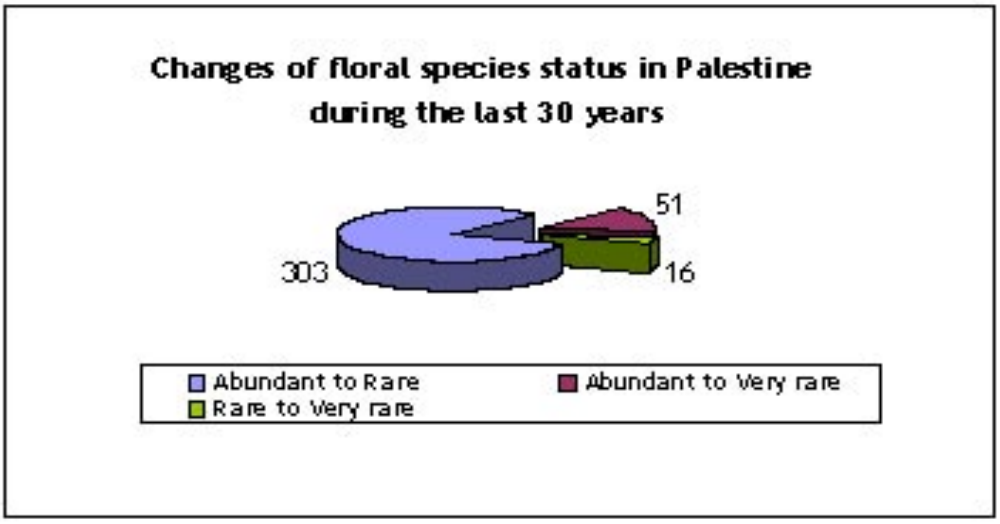


Figure 10.2: Changes of Floral Species Status in the OPT during the Last 30 years

The rapid increase of both population and urbanization in the country has great impacts on natural resources putting additional pressures on land and natural habitat and the development of resources to meet market demand and to satisfy the rising human needs. The growing population will use the scarce resources causing a major threat to the small natural areas in the West Bank and the Gaza Strip. Gaza Strip, for example, has aggravated problem since the dense population in a small geographical area putting a strain on all natural resources. Solid waste is building up; raw wastewater is leaching into the sea, the building on the shore with its environmental impact, over fishing and the potential for offshore extraction of gas.

The uncontrolled disposal of the large generated quantities of domestic, industrial and medical wastewater and solid waste as well as the use of pesticides and the depletion of water and wildlife resources are adding pressures on the environment that pose great pollution threat and endanger public health.

Habitat destruction comes from a broad range of sources. These include unplanned urban expansion, overgrazing, and over-exploitation; deforestation and unplanned forestry activities; desertification and drought; invasive alien species; pollution and contamination; accidental mortality; and hunting. This is in addition to the political status, including the division of Palestinian accessible areas, land confiscation, and the Israeli settlements and Segregation Walls. Not to forget that biodiversity is also being threatened by lack of enforcement of laws and policies concerning its better management and conservation and the limited documentation or research done on natural resources, carrying capacity, conservation programs, responses to threats, and others.

Such factors have been causing huge changes in plant and animal species composition, distribution and density, and thus the loss of such valuable heritage. Those problems have caused drastic changes and have left deep traces on the landscape, natural resources and vegetation of the area. At the moment there is hardly any natural undisturbed vegetation in the area. In addition, such pressures on the integrity of ecosystem and on stability of natural resources increase the risk of losing the livelihood, the historical, cultural, environmental, and economical values of the Palestinian biodiversity. This is despite the fact that these costs are difficult to quantify, or may indeed be immeasurable and irreplaceable.

10.1.5 Biodiversity Indicators for Sustainable Development in the OPT

Indicators and monitoring of biodiversity are important topics in recent political discussions. Chapter 40 in Agenda 21 calls for the development of indicators of sustainable development. In 1995, the Commission on Sustainable Development (CSD) approved a work program on indicators of sustainable development. The Convention on Biological Diversity, ratified by the European Union and its member States, constitutes a formal recognition of the alarming loss of biodiversity and the importance of its monitoring. The third Conference of the Parties to the Convention on Biological Diversity was held in Buenos Aires in November 1996. At that meeting the Parties adopted two formal decisions which reinforce country's need to develop a mechanism to monitor biological diversity and to develop indicators to assess progress. The BSAPP (Biodiversity Strategy and Action Plan) that was developed in 1999 has stressed the importance of monitoring the Palestinian biological diversity components. As a response to all these decisions ARIJ has developed Palestinian biodiversity indicators to monitor status, pressures and response to biological degradation.

Table 10.1: Main Biodiversity Indicators for Sustainable Development in the OPT

	Title	**Description**
	Indicators of Pressure / Threatening Processes	
Ecosystem / Habitat	Habitat alteration and land conversion from its natural state	Deforestration: 59% since 1970 (MOA, 1999) Uprooted Trees: 794162 trees since 10 years. (ARIJ GIS, 2006).
		Palestinian Built up area: increased by 21.3% in West Bank (last 5 years) (ARIJ GIS, 2006), and 41.9% in Gaza Strip (Isaac, J. et al, 2006) Israeli colonies area: increased by 16.5% (last 5years) (ARIJ GIS, 2006)
	Aquatic habitat destruction	Over-fishing: • 33.8% rare fish of total fish species in Gaza • 8.5% are very rare fish of total fish species in Gaza (Ali M., 2002) Pollution: 70-80% of the domestic wastewater produced in Gaza reaches the environment untreated and discharged into the Mediterranean Sea (UNEP, 2003)
	Indicators of State / Loss of Biodiversity	
	Total vegetation cover	Total natural vegetation area forms 25.88% of total West Bank and Gaza Strip area (ARIJ GIS, 2006
	Total forest area	Total forest area forms 1.42% of total West Bank area (ARIJ GIS, 2006).
	Protected areas	Total nature reserves area forms 12.8% in the West Bank and Gaza Strip (ARIJ GIS, 2006).
	Indicators of Response / Biodiversity conservation and management	
	Afforested areas	Total afforested areas forms 4.1% in West Bank and Gaza Strip
	Forest conservation	No Conservation programs
	Marine protected areas	Three natural reserves are located in the coastal area of Gaza Strip including with a total area estimated by 30 km^2.

Table 10.1 Continued

Species	***Indicators of State / Loss of Biodiversity***	
	Extinct, endangered, and vulnerable species and Ecological communities	• Rare species: 303 species (14.7% of total species) • Very Rare species: 67 species (3.23% of total species) • Endemic Species: 102 species (4.9% of total species). • Endangered Endemic Species: 47.1% Low frequent species, 11.8% Rare species, 5% Very Rare species
	Indicators of Response / Biodiversity conservation and management	
	Identification procedures	No detailed procedures for identifying endangered, rare, and threatened species were developed
	Existing strategies	Existing strategies for *in situ / ex situ* conservation of genetic variation are mentioned in BSAPP (Biodiversity Strategy and Action Plan for Palestine, 1999).

Investigating the indicators, it was found that the Palestinian landscape, ecosystems and vegetation have been subjected for changes on a large scale. The rate of natural destruction in the OPT is much higher nowadays with the appearance of new challenges facing biodiversity, as indicated earlier. It is worth mentioning that Palestinian sustainability is inextricably intertwined with the political reality witnessed in the OPT. Hence, the compilation of such data also serves to highlight the tangible and factual damages incurred on the OPT under Israeli occupation and continuing exploitative policies.

10.1.6 Relevant International and Regional Conventions and Treaties

The legal political status of the Palestinian people and its government is complicated. ***Formal recognition of Palestine as a state has not taken place yet, although the PNA has a special status in the UN system.*** Palestine has not been asked to officially ratify the international conventions drafted on global environmental issues. *All the same, Palestine has been "deemed associated with a State that has ratified international conventions". This recognition has enabled the Palestinians to actively participate in almost all of the activities of international agencies and bodies like any other State.* Within this context, the PNA is preparing the ground for building a modern State that would implement the international standards and principles related to the environment.

Many of the biodiversity conservation challenges in the OPT (for example, desertification, sustainable management of water, forests and rangelands) are regional in extent, giving special importance to the potential role of multilateral environmental agreements (MEAs). Although the Palestinian Authority is unable to adhere directly to such treaties, there are clear environmental benefits from participation, not only for to the OPT, but for the region as a whole, as well as for the global community.

The following are those conventions where Palestine was identified and its flora or fauna were listed for protection.

Table 10.2: The Major International and Regional Conventions and Treaties

Relevant Major International and Regional Conventions and Treaties	List of included Palestinian Species
CITES (The Convention on International Trade in Endagered Species)	**Amaryllidaceae** *(Galanthus fosteri, Sternbergia clusiana,,Sternbergia colchiciflora, Sternbergia lutea*); **Orchidaceae** *(Ophrys umbilicata, Ophrys umbilicata, Ophrys umbilicata);* **Primulaceae** *(Cyclamen coum, Cyclamen persicum, Cyclamen persicum var. Autumnale, Cyclamen persicum. var. persicum albidum)*
IUCN (Red List of Threatened Plants)	**Fauna:** *Ablepharus rueppellii, Acanthodactylus beershebensis, Ammomanes deserti, Ammoperdix heyi, Aquila pomarina, Aythya nyroca, Botaurus stellaris, Bufo viridis, Calopteryx syriaca, Cercomela melanura, Chalcides guentheri, Chlamydotis undulata, Circus macrourus, Corvus ruficollis, Crex crex, Daboia palaestinae, Eirenis lineomaculatus, Emberiza cineracea, Falco biarmicus, Falco naumanni, Francolinus francolinus, Gallinago media, Grus grus, Gypaetus barbatus, Gyps fulvus, Hirundo obsoleta, Hyla arborea, Lacerta laevis, Larus audouinii, Lutra lutra, Macroprotodon cucullatus, Micrelaps muelleri, Neophron percnopterus, Numenius tenuirostris, Oenanthe leucopyga, Onychognathus tristramii, Ophiomorus latastii, Passer moabiticus, Platyceps collaris, Puffinus griseus, Rana bedriagae, Rhinotyphlops simonii, Sphenops sepsoides, Strix butleri, Telescopus hoogstraali, Tetrax tetrax, Torgos tracheliotos, Trachylepis vittata, Trapelus savignii, Triturus vittatus, Turdoides squamiceps;* **Flora:** *Juniperus oxycedrus , Ballota saxatilis ssp. Brachyodonta, Daucus carota ssp. Gadecaei, Hypericum thymifolium, Origanum syriacum var. bevanii, Retama raetam ssp. Gussonei, Thymbra spictata var. intricata*
FAO IUPGR (International Undertaking on Plant Genetic Resources)	*Atriplex halimus, Lolium temulentum, Medicago sativa, Melilotus albus*
Euro-Mediterranean Partnership	*Agricultural and fishery products of interest to both Parties*
Jordanian Palestinian Economic Protocol	*Goods and commodities that could be imported from Jordan and vice versa*

Institutional arrangement and responsibilities

The Environmental Quality Authority (EQA) is responsible for:

- Implementing the Biodiversity Convention
- Coordinating all programs related to environment implemented by other agencies
- Formulating and implementing policy plans and programs related to the conservation of biodiversity
- Formulating regulations and creating guidelines on the environment
- Carrying out studies, research, surveys, publication of extension materials, and conducting training programs related to the conservation of biodiversity

The Ministry of Agriculture (MOA), another partner with responsibility for the protection of biodiversity, undertakes the following:

- Formulating policy and plans related to natural resources and land use management;
- The Rangelands and Forests Directorate (RFD) at the MOA is responsible for the management, control, utilization and conservation activities of national forests and to improve and manage protected areas;
- The National Agricultural Research Centre (NARC) is presently working in developing seed gene bank;
- The Extension and Applied Research directorate has also planned to establish a new field gene bank where fruit trees are grown for the preservation and rehabilitation o f existing types.

Registered environmental related local NGOs address a variety of issues in this area. Although most NGOs are not involved in conservation management activities, many of NGOs are initiating public awareness programs to raise an understanding of the need to conserve biodiversity and use biological resources in a sustainable manner and income generation activities based on biodiversity.

The Applied Research Institute-Jerusalem (ARIJ)

- Support the development of national plans and strategies concerning Palestinian biodiversity conservation.
- Establishment of Herbarium unit
- Conduction of Flora & Fauna databases
- Preservation of PGR's Seeds
- Inventing Palestinian forest trees
- Research biodiversity indicators, pressures and necessary responses

Map 10.1: Overlap between Forest, Natural Reserves and Israeli activities across the Agro-ecological Zones of the West Bank

10.2 MARINE RESOURCES

10.2.1 Introduction

The OPT has access to the marine environment via the 42 km long Mediterranean coastline of the Gaza Strip. Following the Gaza-Jericho Agreement of 1994, previous restrictions on maritime access were lifted, and Gaza was granted territorial waters, as well as access for fishing to a zone extending 20 nautical miles off shore. That is with 1 mile and 1.5 mile wide closed border zones, along the Egyptian and Israeli sides, respectively. The Gaza coastal basin is bounded by the Nile Delta to the south, and by the Haifa cost to the north, forming the south eastern corner of the Levantine Basin.

The Gaza Strip is comprised mainly of sand-dune and coastal-plain environments. It experiences a temperate climate with hot, dry summers and mild winters. Between 61-75% of rainfall in the Gaza Strip is lost via evapotranspiration, and it is estimated that only 2.5% enters the sea in the form of runoff via wadis and streams (Isaac et. al., 1994; Homer-Dixon and Kelly, 1995). There are three significant wadis, which dissect the Gaza Strip and drain into the Mediterranean. Wadi Gaza is the largest and most important, Wadi Beit-Hanoum, and Wadi El-Salqua. The influx from the wadis varies seasonally, with the highest levels coinciding with the winter rains.

The shoreline of the Gaza Strip consists of beaches, sand dunes, coastal cliffs, and built-up areas, particularly in the Gaza City region. The land area of the coastal zone covers approximately 72 km². Prior to the Israeli disengagement in 2005, 48 km² of that area was occupied by illegal Israeli settlements (Ali, 2002). Of particular ecological importance is the presence of marine angiosperm Posidonia Oceanica, reported to be present in the near shore waters of the Gaza Strip, to a depth of 35-40 m (Hosh, 1995). Posidonia meadows are perhaps the most productive marine ecosystem in the Mediterranean, supporting very high population densities of epiphytic Flora and Fauna, and providing shelter and foraging areas for many commercially important fish species (EUNIS, 2006).

Current uses of the marine environment are dependant on an acceptable level of cleanliness of both the waters and sediments. The beaches are one of the few recreational areas available to the residents of the Gaza Strip, and potentially may be exploited by the tourism industry to bring more revenue to the local economy. Offshore, the fishing industry is also reliant on the health and productivity of the marine environment. Fish has traditionally been a mainstay of the Gazan diet (Feidi, 2000), and with the current depletion of poultry supplies caused by the threat of Avian Flu (WFP, 2006), the pressure on fishery resources is even greater. The relatively recent discovery of natural gas reserves within Gazan offshore waters prompted British Gas (BG) International to sign a 25-year agreement with the Palestinian Authority to "establish a Palestinian gas industry by conducting exploration, field development, and building gas pipeline infrastructure" (BG Group, 1999). So the Gaza's marine environment contains, potentially, a very lucrative exportable resource, and the exploitation of which, brings its own environmental concerns.

10.2.2 Ecology of the Marine Environment

The near shore seabed of the Gaza Strip's slopes is with a gradient around 1:100. The coastal shelf (to almost 100 m depth) is 28 km (15.1 nautical miles) wide at the southern boundary of the Gaza Strip, and 14 km (7.6 nautical miles) in the north. After the 100 m depth contour, the sea bed drops more steeply. The benthic substrate is mainly sand with occasional rocks and some muds (Ali, 2002).

The marine area of the Gaza Strip is part of the Southern Levantine Basin, characterised by high salinity

(up to 39.5 psu), high temperature (up to 29º C) and extreme oligotrophy (Ali, 2002). The predominantly anti-clockwise cycling of water in the eastern Mediterranean causes the prevailing current along the Gaza coast to flow to the north; a fact of great significance to the people of the Gaza Strip. This same northerly current was historically a conveyor of significant amounts of terrigenous (transported) sediments and organic matter from the Nile River. $43x10^9$ m^3/yr freshwater discharge, carrying 140 million tons of mud and silt, are used to nourish the Levantine Basin seasonally (Ben Tuvia, 1983). This boosts both plankton densities and fisheries yields (Oren, 1969; Azov, 1991). Following the operation of the Aswan Dam in 1965, the volume of water discharge from the Nile decreased 10 fold, with a corresponding decrease in nutrient-rich sediments (Kashef, 1981; Azov, 1991).

The Levantine basin, and indeed the eastern Mediterranean as a whole, only undergoes one significant phytoplankton bloom per year, peaking in April, with a maximum productivity approaching 500 mg/cm2/day (based on SeaWiFS data, 2005). Mean annual productivity is in the range of 10-20 g/cm2/yr (Berman, et al. 1984), making this area the least productive of the whole Mediterranean basin. As primary productivity is related to the carrying capacity of an ecosystem for supporting fish resources (Pauly and Christensen, 1995), the very low primary productivity of this part of the Mediterranean basin is an important consideration with respect to the fishery demands of the Gaza population.

As mentioned earlier the nearshore waters of the Gaza Strip are home to Posidonia oceanica meadows (Hosh, 1995; WFP, 2006). However, Ali (2002) stated that "sea grass species are not present in the sea of the Gaza Strip, because the sea bed in this area is not sheltered". Posidonia meadows are very important habitats, supporting a diversity of over 200 other species. However, Posidonia meadows are susceptible to pollution and disturbance. Severe benthic disturbance, as is caused by bottom trawling, will cause destruction of areas of Posidonia, and fragmentation of the meadows. Higher than natural levels of organic matter in the water column, as that may be caused by the input of untreated or partially treated sewage, can trigger a bloom in faster reproducing epiphytic communities. This can reach a level, where Posidonia suffers from leaf fragility and reduced light availability (Cancemi et al. 2003), which leads to a corresponding reduction in primary productivity. Given the ecological importance and the fragility of Posidonia habitats, it is very important to notice that the ambiguity, concerning its presence or absence in the Gazan waters, is removed with some urgency.

10.2.3 Coastal and Marine Resources

10.2.3.1 Fisheries

Historically, the fishing industry was a very important contributor to both the food security and economy of the Gazan population. High value demersal species formed the main exports to foreign markets, whereas pelagic landings were consumed locally. During the past 40 years of Israeli Occupation of the Gaza Strip, the fishing industry has been very erratic; a result of varying restrictions on access to the sea granted to the fishing community by the Occupying Forces. Since the Oslo accords signed in 1994, the Gaza Strip has had legal access to fish in an area extending 20 nautical miles offshore. This included closed border zones of 1 and 1.5 nautical miles along the Egyptian and Israeli sides, respectively. However, continuing Israeli imposed restrictions mean that it has been very rarely possible for Gazan fishers to utilise the whole area. Indeed, even today, following the "full withdrawal" of Israel from the Gaza Strip, the continuing near shore military presence restricts the fishers to a zone extending only between 6 and 12 nautical miles from the coast (OCHA OPT, 2005). Israeli Forces imposed a complete ban on fishing between September 24th and October 9th 2005, depriving the Gazan fishermen of a peak productivity season. The current limit on the fishing zone is 6 nautical miles (WFP, 2006).

Between 2000 and 2004, the size of the Gazan fishing fleet has not increased significantly, with only 2 more boats being recorded. However, over the same time period, the number of recorded fishermen increased by 693 (Ali, 2002). In fact, the number of boats has remained fairly stable since 1983, whereas the number of fishermen has risen sharply since 1988 (Ali, 2002) .The largest fleet is concentrated in the Gaza Governorate, and the only registered trawlers fish from there. This is a result of the Gaza City having the only significant dock facilities capable of handling larger vessels. There are plans to construct a new port in the Gaza Governorate, which could lead to a dramatic increase in trawler capacity.

The sardine (*Sardinella aurita*) is, by far, the most important species in the Gaza's fishery, in terms of overall catch weight (Figure 10.3). There are two peaks in fishery productivity; one in spring and the other in autumn. These coincide with the seasonal migrations of fish stocks between the Nile Delta and Turkish waters, which occur in April and October (OCHA OPT, 2004, 2005, 2006). Sardinella populations have a very short doubling time of less than 15 months (Fish base, 2006). However, juvenile Sardinella remain in near shore nursery areas until maturity, when they move offshore to join the adult stocks. The restrictions on the Gazan off shore's fishing access, and the corresponding drive to intensive near shore fishing methods, mean that the populations of juvenile Sardinella are particularly vulnerable to overexploitation.

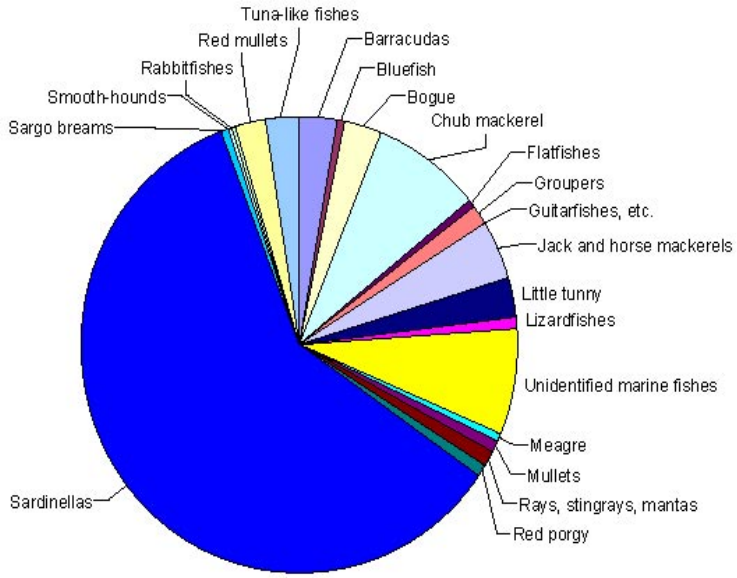


Figure 10.3: Annual catch composition of the Gaza fishery made up from the mean weight of annual catches between 1996 - 2004 (FAO, 2006).

Sardinella comprises a far less significant proportion of the Israeli fishing fleet's catch. Since 1970, the proportion of Sardinella in Israeli catches has fallen from approximately 30% to around 2% (FAO, 2006). Interestingly, the data for Gazan fisheries indicates that, since the start of data availability in 1995, Sardinella has fairly consistently made up around 60% of the total catch. This clear cut difference between Israeli and Gazan catches would suggest that Israel has been gradually shifting focus away from Sardinella in favour of targeting other fish species, while the Gazan fishery has remained predominantly Sardinella based. This difference could be a consequence of the different environments available to both Israeli and Gazan fishing fleets. The Israeli fleet is able to target pelagic and deep water fish, and to fully take advantage of the seasonal migrations of fish between the Nile Delta and Turkish waters. Whereas the Gazan fishing effort is concentrated in a narrow coastal belt, currently extending only 6 nautical miles offshore, with negligible access to deep water and the migrating shoals. A consequence of the high demand and limited resource availability was that the price of sardines doubled from 15 NIS/kg in January 2006 to 30 NIS/kg in March 2006.

10.2.3.2 Recreation

A Mediterranean beach, nearly unbroken for approximately 45 km, is a valuable asset to the recreation and tourism sector of any country. Unfortunately for the Gaza Strip, the present political climate excludes virtually all international visitors, and tourism to this site is predominately local based. As virtually the only accessible open space in the Gaza Strip, the beach is a popular destination for family outings. Formerly, the Wadi Gaza and associated wetland and salt marshes provided a valuable recreation resource. The present levels of environmental degradation and urban expansion in this area mean that this site no longer provides such a service.

10.2.3.3 Shipping and the Proposed Gaza Port

At present the only real maritime access for the Gaza Strip is from the small port in the Gaza City, used by small fishing vessels. During the Sharmesh-Sheikh Agreement signed in 1999 between Israel and the PLO, the construction and operation of an international seaport in the Gaza Strip was agreed upon. An area of land 5 km south of the Gaza City has been designated for the construction of the seaport (Isaac et. al.,2006), which will be large enough to allow for access of the international shipping industry with the future State of Palestine. In 2000, Israel effectively stopped progress on this front by preventing the transportation of construction materials. Following the Israeli pullout from the Gaza Strip, an agreement between both sides, on the 15th November 2005, stated that construction of the seaport could commence. However, following the PLC (Palestinian Legislative Council) elections, the Israeli Government has stopped talks with the Palestinian Authority on this issue, and so still no progress has been made (OCHO OPT, 2006). The construction and eventual operation of a seaport in the Gaza Strip will open the future State of Palestine for trade with the international community. This means that terrestrial border closures by the Israeli authorities will no longer cause significant amounts of produce to spoil. It also means that trade can be conducted directly with source countries rather than having to go through Israel.

10.2.4 Conflicts and Possible Resolutions

10.2.4.1 Fishery

The Israeli control of all movement across the borders of the Gaza Strip means that Gazan fishing products destined for export are frequently not allowed out. This results in large quantities of goods spoiling and having to be discarded; wasting the time, effort and resources of all persons involved in their production, processing and transportation. In former times, there was a high demand for Sardinella Aurita by the Israeli canning industry, and economic returns from this fishery resource were favourable. However in recent years external demand for this product has waned to such a level that even if exports were possible, the financial returns would barely make it worthwhile.

In order to fully assess the sustainability of the Gazan fishery, athorough investigation into the demographics of the exploited resource populations is required. Perhaps the most important factor, determining the future sustainability of the Gazan fishing resource, is that of access. Currently, Israeli restrictions limit fishing to the very near shore waters, if at all. A consequence of this is decimation of stocks of sheltering juveniles and of breeding adults, thus removing the possibility of future generations or subsequent breeding attempts. In order that the Gazan fishing industry may target legitimate, sustainably exploitable fish populations, it is imperative that the fishing fleet is allowed uninterrupted, year round access to the migratory routes 12 nautical miles offshore. Not only is this important to the Gazan fishing fleet, but relieving the pressure on breeding and juvenile stocks in the near shore waters will benefit fish stocks in

the wider Levantine Basin as a whole. It will be impossible to achieve this without Israeli co-operation, and so it is critically important that the Palestinian and Israeli authorities, along with the international community, focus on this matter with some urgency.

10.2.4.2 Recreation

The Gaza Strip contains two major areas which offer potential recreation resources, which are the Mediterranean coast and the Wadi Gaza system. Clearly the first concern as to whether these resources may be exploited as a means of generating revenue through tourism (domestic and international) is that of security for the Gaza Strip's population. The current situation in the Gaza Strip does not allow any form of recreation or tourism. However, assuming that one day the Gaza Strip will be ready to receive tourism, it would be pertinent to adopt strategies now that will facilitate the development of a tourism sector when the opportunity arises. Rehabilitation of the Wadi Gaza system is one of the most pressing needs. As not only does the Wadi Gaza provide a potential recreational resource, the biological importance of this site has the potential to benefit the wider ecology of the Gaza Strip and wide-ranging migratory birds. Although not yet a sovereign state, and so unable to be join the Ramsar Convention for protection of wetlands, The future state of Palestine would be well advised to develop rehabilitation and management strategies based on international conventions, such as Ramsar and the Mediterranean Wetlands initiative (of which the Wadi Gaza already is a part), in order to facilitate accession once statehood has been achieved.

10.2.4.3 Natural Gas, Shipping and the Proposed Gaza Port

There are many environmental considerations to take into account during the construction and operational phases of both the Gaza's seaport and natural gas extraction operations. Numerous international conventions have been drawn up to regulate activities in these sectors, primarily concerning trans-national commitments to prevent incidents of pollution. It is not possible for the future State of Palestine to formally accede any of the conventions, as it is not yet a sovereign state. However, in order to gain greater acceptance in the international community, and to show readiness to actively participate on environmental issues, it would be appropriate for the Palestinian Authority to conduct activities within the guidelines of the conventions, indicating a clear will to accede fully, as soon as the opportunity arises.

10.3 Outlook

Prior to disengagement, the Palestinian Ministry of Environment formulated a plan of action to follow when disengagement was implemented. In this plan are lists of required information, concerning both the coastal area, in general, and biological diversity in particular (http://withdraw.sis.gov.ps/english/EP.html). In addition, the findings of this report are very much in agreement with the recommendations of the Palestinian Ministry of Environment. Moreover, it is advised that the following needs are addressed as a matter of priority:

1. Provision of information on sources of wastewater pollution into the Wadi Gaza and the Mediterranean Sea, and increase/restore connectivity of the population to waste water treatment facilities.

2. Provision of information on organic and chemical pollution of the Wadi Gaza and Mediterranean Sea, with subsequent identification of sources of contamination.

3. Confirmation of the presence or absence of Posidonia Oceanica meadows in the Gaza waters.

4. Stock assessment of targeted marine fish populations (in terms of mean age, size and maturity of captured individuals). So, overall resource sustainability can be assessed, and strategies for efficient sustainable exploitation of this resource can be designed. Fishing methods also need to be investigated, and the number of undersized fish and by-catch should be minimized.

It is also necessary to conduct activities to promote the future sustainability and health of the coastal environment in the Gaza Strip. One of the most critical environmental concerns is the health of the Wadi Gaza ecosystem, and its restoration should be seen as a high priority activity. Not only would a restored Wadi Gaza provide a valuable asset to the Gaza Strip in terms of a tourism resource, but wetlands and associated habitats have a very high value in terms of environmental services. Thus, every activity conducted in the marine environment should be conducted in a manner sensitive to the presence of the valuable habitat type, making every effort to conserve it.

Biodiversity:

The biodiversity is of immeasurable value. It is considered a life-support system that provides a foundation for a healthy functional ecosystem and continued human survival. A more diverse ecosystem gains resilience and is able to withstand environmental stress. And, thus, it is more productive and has higher opportunities to adapt to environmental changes. The many values of the biological diversity indicate the importance why to conserve the biodiversity. So, the continued pressures on the Palestinian indigenous plants and animals, as a result of military occupation and political instability, will inevitably impair the rights of future generations if sustainable utilization measures are not implemented.

As a long-term research endeavour, it is necessary to improve the Palestinian knowledge of how human and natural systems interact. While in the short run, it is needed to develop approaches for monitoring and forecasting human impacts on Palestinian ecosystems. Criteria and indicators for social, economical, and biological components of plant and animal ecosystems are the core of current sustainability initiatives.

Although, generally speaking, there is a growing awareness in Mandate Palestine of the need to conserve natural resources, the formal institutions for studying, recording, and monitoring plant resources is still incomplete. It is imperative that a biological survey is necessary, in order to monitor changes in the Palestinian ecosystems. However, national and international funding for these activities are crucial. In addition, national guidance is required, in order to ensure the continued monitoring of the Country's natural resources.

Efficient planning for new and sound environmental management requires detailed surveying and mapping of relevant areas. Appropriate development organizations should encourage research in ethno-biology to identify plant and animal species used by local people, living in surrounding forests. The specialized knowledge that local people have accumulated about economically useful plant species and about how the ecosystem functions (including the likely effect of certain human disturbances) can be of great use to the Palestinian society. Such an ethno-biological research would prevent species from being irretrievably lost.

Research and development programs have to cover all aspects relating to the species from collection to utilization or conservation. It is desirable to have a 'need based' approach to research on plants, including screening of plants for biological activity. In the wake of all these developments, the Palestinian policy-makers are being challenged to develop appropriate policies to regulate the use and conservation of resources. At present, the policies prepared, related to this issue, are still missing important info concerning sustainable utilization of biological resources. This is important especially when dealing with issues concerning mis-utilization, including free and uncontrolled gathering, hunting and trading in plant and animal species at national and international levels.

Thus, the future of the Palestinian people on their land is largely dependant on its biodiversity conservation, as well as on the sustainable use of its components. So, the following are some developmental suggestions that should be taken into consideration while planning for better utilization and conservation of the Palestinian biological resources.

1. Conservation and Better Management

Protected areas

The setting up of natural heritage areas, which would be in the form of national, regional and local parks with various protection levels to serve the intended needs.

Botanical Gardens

Establishment of botanical gardens can be necessary to complete the nature conservation network

Forests Improvement

Protection of natural forests and promotion of afforestation are necessary activities to improve forestry sector.

Rangelands Improvement

Improvement of protection and rangeland management and the enforcement of laws concerning this sector.

Fauna conservation

Developing and implementing action plans for the conservation of various species of fauna, foremost among which are raptors, invertebrates, insectivorous bats and amphibians is also important

Better Coastal Zone Management

The fundamental environmental threats on the coastal zone in Gaza should be resolved and beach protection, water quality monitoring, pollution reduction, migratory birds' protection, are all necessary.

Genetic Resources

Genetic preservation, characterization, utilization and commercialization of such resource could be an opportunity to the Palestinians to preserve their plant genetic diversity.

2. Legislation and Regulation

There is a need for a comprehensive review and development of Palestinian policy and legislation pertaining to PGRs utilization and conservation, incorporating standards of accreditation, intellectual property rights, indigenous knowledge, training and research

3. Public awareness and Training

The integration of biodiversity principles in educational programs on all levels; to promoting knowledge and expertise through formal and non-formal education, ongoing research, and increased institutional capabilities, are all necessary.

4. Research

Strengthen taxonomic and systematic research, ecology, habitats and wildlife population studies, indigenous genetic resources, and popular knowledge assessments. Implementing field measurement and assessment surveys to get a grip on existing biodiversity and the identification of those under threat or are presumed lost or extinct is a first step that should be taken. As a result a Species List and a Red List of threatened species of fauna and flora can be formulated and a computerized information center can be established.

5. Institutional Cooperation

All governmental and non-governmental organizations working in the field of PGRs must cooperate and take the necessary actions to deal with the PGRs' problems that have occurred and/or exacerbated. It is believed that the most vital action is to conduct decentralized Biodiversity projects in order to fit with prevailing political situation, and to create new job opportunities for the marginalized local communities.

6. International and Regional Co-operation and Co-ordination

The harmonization of national action with international and regional conventions, activities and plans

7. Income Generation and Community Development

Enhance income generation activities for the local community such as the plans suggested by BSAPP and Agro-biodiversity strategy including: Rehabilitating damaged ecosystems in order to promote biodiversity conservation as rangeland areas and rainfed agriculture areas; and encouraging the sustainable use of the household food processing such as medicinal plants, and others.

Chapter Eleven 11

Climate Change

11.1 Introduction

Climate change refers to long-term fluctuations in temperature, precipitation, wind, and other elements of the Earth's climate system. It is recognized as a major issue of global concern with serious and long-term challenges that have the potential to affect every part of the globe, including the Occupied Palestinian Territory (OPT). Climate change varies naturally on all timescales, ranging from decades to millions of years, due to changes in climate elements. Recently, however, human influences are thought to be bringing about a rapid change in the climate, due to massive emissions of greenhouse gases. This has both direct and indirect long-term climate impacts on every region of the globe, causing alteration of oceanic and atmospheric currents that lead to shifts in precipitation patterns and changes in air temperature. In addition, a rise in the Sea Level, due to melting of the polar ice-caps and glaciers, threatens coastal regions with flooding. Figure11.1 shows the average global temperature for the period 1880–2005. It shows clearly that a trend of temperature increase has occurred during the last 25 years, with a general increase of about 1.2°C.

According to the Intergovernmental Panel on Climate Change 'IPCC', which is a global body of more than 1,500 scientists, the average global temperature is projected to rise by between 1.4°C to 5.8°C by the end of the 21st Century.

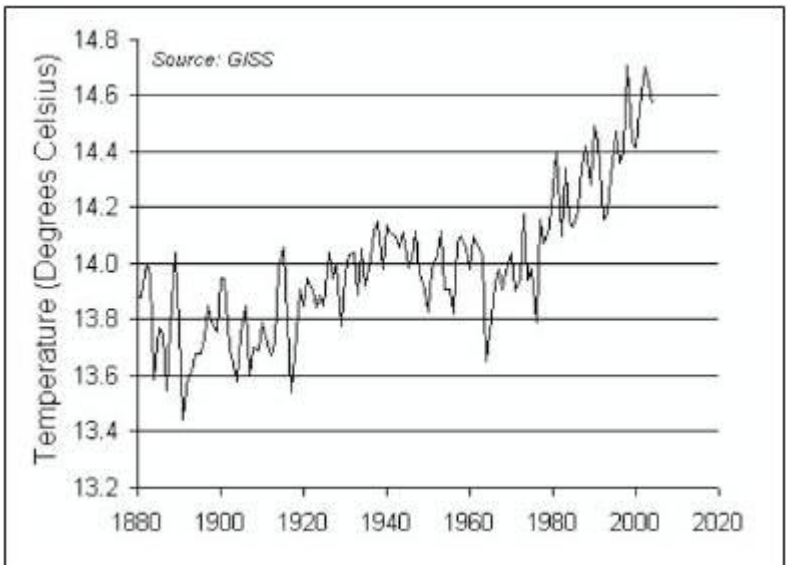


Figure 11.1: Average Global Temperature 1880 – 2005 (GISS, 2005)

However, considerable uncertainty does exist over projected climate changes at the regional scale, due to the weaknesses and limitations of the different types of global circulation models in assessing regional climate variations. Nevertheless, simple models of the climate system can be used and developed, in order to gain physical insight into major features of the behavior of the climate system, and to produce climate projections for a range of assumptions about emissions of carbon dioxide and other greenhouse gases. But year-to-year and longer time-frame variations in climate are difficult to predict. This is due, primarily, to the chaotic nature of the climate system. This means that small errors in predictions of climate variations quickly grow to become very large errors. Thus, this behavior would place very strong limits on the potential predictability for climate variations. In spite of such limitations, there is still some skill in predicting future climate, which comes from the ability to predict slowly changing parts of the climate system, including, for instance, the relative humidity or number of extreme events per year. This summary aims to briefly high light the issue of climate-change risks in the OPT.

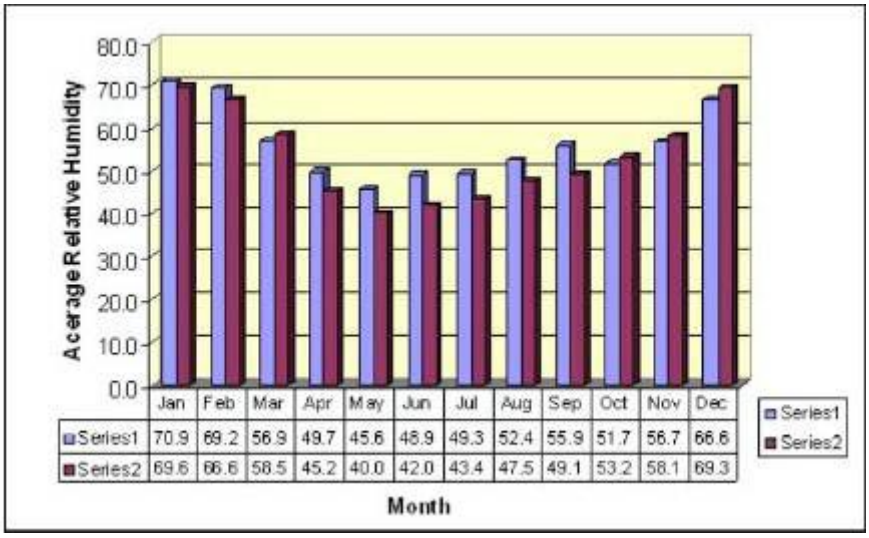
11.2 Observed Climate Change in the Eastern Mediterranean Region, Including the OPT

The OPT is located in the region where both mid-latitude and equatorial atmospheric processes play major roles during the wet season (November to April). This, in turn, makes any weather prediction very hard. However, a number of physical elements (discussed in the case study below) have been clearly affected by the global trends of climate change, which is the core problem of the 21st Century.

CASE STUDY I: Relative Humidity of the Dead Sea and Jordan Valley Region

The Dead Sea and the Jordan Valley form a unique microclimate. The Dead Sea itself is the terminal lake of the Jordan Rift Valley, which extends from 35°30'00" to 35°34'05" East and from 30°58'01" to 31°46'01" North. It is the lowest point on the surface of the Earth, and its water has the highest density and salinity of any sea in the world. Because of its low elevation and its position in a deep basin, the climate of the Dead Sea area is unusual. Its actual evaporation from its surface ranges between 1,300-1,600 mm/yr, and depends on several climatic variables (e.g., wind speed, relative humidity, temperature, surface water temperature, water salinity and density).

Figure11.2 illustrates the variations of monthly average relative humidity in a two-time series in Jericho city (the largest community in the region). Series 1 represents the historical time series data (1925–1934), which was derived from the "Climate Data Imaging Project", held by the National Oceanic and Atmospheric Administration (NOAA). Series 2 represents the newest available time series data (1987-2004). The Figure clearly indicates that a decrease of about 5 units in relative humidity has occurred recently, during the dry season (April-September). This might be attributed due to the decrease in evaporation rates during the past 20 years. This phenomenon can be considered as an indicator of climate change in the region as a whole.



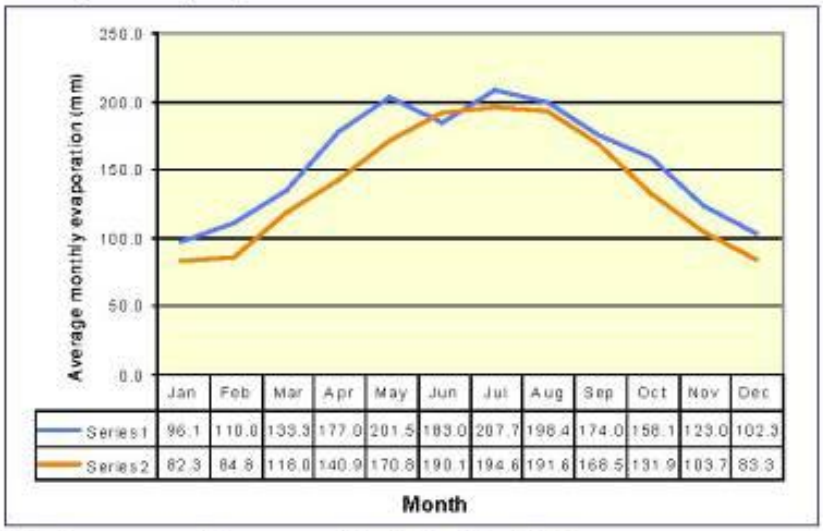
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Series1	70.9	69.2	56.9	49.7	45.6	48.9	49.3	52.4	55.9	51.7	56.7	66.6
Series2	69.6	66.6	58.5	45.2	40.0	42.0	43.4	47.5	49.1	53.2	58.1	69.3

Figure 11.2: Monthly average relative humidity in a two time series

However, it must be kept in mind that other factors (other than evaporation) may be behind the observed trend (illustrated in Figure 11.2). However, the continuous increase in the Dead Sea salinity, during the past 50 years, is mainly due to the less in flow of fresh water to the Dead Sea.

CASE STUDY II: Evaporation Reduction in the Gaza Strip

The climate of the Gaza Strip is a transitional one between the arid climate of the Sinai Peninsula and the temperate semi-humid climate of the Mediterranean Sea. This study is the first attempt to assess how a specific region in the Gaza Strip is reacting to climate change. Specifically speaking, changes that affecting the evaporation rates, are demonstrated based on two averaged data sets. These include the first time series (old) covering a10-year interval (1925-1934), and the second time series (new) covering a 9-year interval (1997-2005). Figure 11.3 shows the average monthly evaporation rate for both time series.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Series1	96.1	110.0	133.3	177.0	201.5	183.0	207.7	196.4	174.0	156.1	123.0	102.3
Series2	82.3	84.8	116.0	140.9	170.8	190.1	194.6	191.6	166.5	131.9	103.7	83.3

Figure 11.3: Average monthly evaporation in the Gaza Strip

Contrary to the well-known fact that global warming is supposed to increase surface air temperature and, hence, increase the evaporation rate, it was found here that an apparent decrease in the average monthly evaporation rate has taken place. This reveals a remarkable feature in this unique coastal region. This unusual behavior can only be explained by noting that physical factors (e.g., humidity, soil texture, vegetation, salinity, etc.), other than air temperature, must be taken into account. For example, the rate of evaporation decreases exponentially as soil dries out, simply because further evaporation depends on rise of soil water and groundwater to the surface. 1% increase in salinity will result of approximately 1% decrease in evaporation.

The results are consistent with the observed increasing salinity levels in the soil of the Gaza Strip during the past 60 years, due to the increasing demand for groundwater, which leads to an increase in the soil salinity. Besides, the increase of the amount of aerosols in the air has a direct effect on the amount of solar radiation, hitting the Earth's surface and, therefore, it can play a vital role in the evaporation decline. This outcome is called the "global dimming" effect (gradual reduction in the amount of global direct irradiance at the Earth's surface). This, in turn, creates a cooling effect that may have partially masked the effect of greenhouse gases on global warming (Stanhill et. al, 2001). This suggests that land-use changes induce regional climate change. At the first look, it seems that increasing salinity plays an important role in climate mitigation in the Gaza Strip, but it has critical and destructive effects on domestic water quality, biodiversity, and the agricultural industry.

11.3 Precipitation Patterns

The global water cycle is a fundamental component of the climate system, in which water is cycled between its major components (ocean, atmosphere, and biosphere). According to the available Global Climate Models' predictions, there will be substantial changes in water availability (quantity, quality, and flow) over the globe as a whole. On average, some areas will become drier and others wetter.

The Middle-East region has an arid climate with very scarce water resources, which are under heavy and increasing stress. Therefore, it is vulnerable to climate change that will eventually reduce rainfall, due to changes in oceano-atmospheric circulation patterns. According to climate models, it was found that a decrease in precipitation is likely to occur around the 300N latitude belt (Schlesinger et. al, 1989). Since the OPT lies around this belt, the consequences of any such projection may be hazardous for the status of its ecosystems.

The probable continuous decline in precipitation can be explained by the fact that an increase of temperature (due to increase in greenhouse gases) will decrease the occurrence of frequency of the mid-latitude cyclones in the Eastern Mediterranean, which play a major role in precipitation enhancement. However, land use changes may enhance rainfall events. For example, a decrease in surface albedo (the ratio of reflected to incident electromagnetic radiation power) in an arid region will boost convection processes and, hence, may cause an increase in precipitation events (Ben-Gai et. al, 1993). General assessments of the impact of climate change on precipitation can be done by obtaining long-term climatic data from the Global Climate Models (GCMs). The GCMs are a class of computer-driven models for weather forecasting and predicting climate change. The Regional Climate Models (RCMs) are useful tools for generating high resolution climate-change scenarios for use in climate impacts and adaptation studies in order to be used as input to the basin hydrological models. Unfortunately, such data are unavailable in the OPT. If presumably available, they don't have the required time-span that permits reliable statistical correlation of inputs (e.g., precipitation patterns) and outputs (e.g., evaporation, runoff, etc.).

11.4 Extreme Weather Events

Extreme weather events, such as droughts, heat waves, floods, cyclones, and hurricanes are sometimes catastrophic for human life and ecosystems. The frequency of such extreme weather events is expected to increase with climate change, due to perturbation of oceano-atmospheric circulation patterns. Statistical analysis and predictions in such systems are complicated, due to the fact that, on the one hand, extreme events may appear as "outliers", whose statistical properties do not seem to conform with the bulk of the data. On the other hand, they dominate the tails of the probability distributions and the scaling of high moments, leading to "multiscaling".

Temperature increase trend

The increase in temperature over the past 20th Century was obvious. That increase was by no means, uniform during the last decade, with the year 1998 being the warmest. This trend continues until 2005, which surpassed 1998 to end as the hottest year globally in the 125 years, since reliable records have been kept. Generally speaking, heat waves have become longer and more intense.

Precipitation Intensity

The OPT, along with its neighboring countries of the Mediterranean region, has experienced tumultuous

rains and flooding. Such events were not frequent in the past. An increase in rain intensity, combined with a decrease in the overall precipitation, will certainly increase the surface runoff, and, thus, soil erosion and salinization income will also increase. Moreover, by the end of the last Century, the autumn of 1999 across the OPT was worse than any year in the decade, which increased the drought to a critical value.

Table 11.1: Extreme weather events in the Occupied Palestinian Territory (OPT) during the last few years (1997 - 2004)

DATE	EVENT
March 18-19, 1997	A heavy storm hit the central and southern parts of the West Bank. It was the second heaviest storm to occur in March in the past 60 years.
July-August, 1998	The summer was the hottest summer in the past 35 years in the region. Temperature rises up to 46.8° C in Jericho.
September-November, 1998	The driest and warmest autumn in the past 58 years in the OPT
January 24, 1999	Hailstorm hit Jerusalem, with hailstones as big as marbles (about 1.3 cm diameter).
November 28, 1999	Unusually cold and dry weather hit the OPT. Temperature in Jerusalem reached down to -6° C.
July 2000	Hottest July in the OPT in the last 50 years, with a mean temperature 4° C higher than average. Highest recorded temperature (41° C) in Jerusalem since 1888.
February 2003	February was the wettest month since December 1991, and the wettest February ever recorded.
May 29-30, 2003	Lowest pressure (995 mb) ever recorded in May of, accompanied by incredible sand storm that covered the entire OPT and the region, with thick red sand and dust.
May 9-10, 2004	Very intense heat affected the OPT especially during the night of May 9, when 32° C was recorded in Jerusalem. Amazingly, the following night's temperature in Jerusalem was 20° C lower than noon's temperature.
ARIJ, 2006	

In conclusion, weather events that may appear unpredictable on relatively short-time horizons are actually a consistent part of a multiscaling statistics on longer-time horizons.

11.5 Recent Anthropogenic Factors

This section presents up-to-date preliminary observations originating primarily from Israeli destructive operations in the Palestinian environment. It reveals insights of direct anthropogenic factors that may severely affect our climate on the individual and community levels.

There are almost 93 major forests in the West Bank and 13 in the Gaza Strip, covering about 230 km^2 and 2 km^2 respectively. Forests cover approximately 4% of the total area of the West Bank and 0.5% of the Gaza Strip. It is well-known that forests alter the environment by moderating climate, improving air quality, conserving water, and harboring wildlife. Climate control is obtained by moderating the effects of sun, wind, and rain. Radiant energy from the sun is absorbed or deflected by leaves on deciduous trees in the summer and is filtered by their branches in winter.

The Palestinian natural ecosystems are a casualty of the Israeli Occupation, due to the systematic uprooting of both natural and planted trees, to the demolition of fertile agricultural land, and to the destruction of groundwater aquifers. The construction of the Segregation Wall, upon completion, will intensify these problems. Tens of thousands of trees were uprooted and other trees of thousands are being

uprooted in the West Bank. In addition, the Wall itself will act as a physical barrier to the terrestrial ecosystem disrupting wildlife corridors and, hence, wildlife mobility.

Over 1.3 million trees have been uprooted by the Israeli Occupation Forces between September 2000 and March 2006 (WHO, 2006). This will have a destructive effect on the OPT's climate, by disrupting the natural carbon sequestration process, in which carbon dioxide (CO_2) from the atmosphere is absorbed by trees, plants and crops through photosynthesis, and is stored as carbon in biomass (tree trunks, branches, foliage and roots) and soils. Trees that sequester carbon, when subjected to anthropogenic disturbances, can suddenly or gradually release the carbon back to the atmosphere. Practices that increase carbon losses and decrease sequestration generally devastate the quality of soil, water, air, wildlife habitat, and the ecosystem in general.

Industry and Human activities

The increased population and industrial zones, and the expanded human and industrial activities (especially in the lack of regulations and as a result of 40 years of the ongoing military Occupation) in the OPT have increased the amount of smoke and hazardous gases, which contain greenhouse gases emitted into the air. Transportation is one of the major contributors to air pollution. The increased use of automobiles (especially the older ones) in the OPT emits tons and tons of hazardous gases, such as carbon monoxide (CO), nitrogen oxides (NO_x), sulfur oxides (SO_x), and hydrocarbons (HC). Also burning vegetation and the increased amounts of fossil fuels used as a source of energy emit large amounts of carbon dioxide (CO_2).

There are many industrial zones and industrial activities in the OPT. Certain industries emit smoke, hazardous and toxic gases in huge amounts, which have increased the level of greenhouse gases in the atmosphere. For example, some metal factories reuse the used motor oil as fuel, and the pottery industry use tires as a source of energy. In both cases, large quantities of toxic gases including CO, CO_2, and NO_x are produced and emitted into the air. Also, the charcoal industry produces large amounts of CO, and CO_2. Moreover, ozone (O_3), which is a powerful greenhouse gas, is also produced from the photochemical reaction of the nitrogen and carbon molecules, present in the atmosphere. In addition, there are many Israeli industrial sites throughout the West Bank, which pollute the atmosphere with huge amounts of greenhouse gases.

11.6 Climate Change Impacts

The following points summarize the major physical and socio-economic impacts of climate change in the OPT. It should be borne in mind that spatial and temporal climate change complexities make their impacts on ecosystems and human communities also complex.

Water Resources

Interest in water resources in the Mediterranean countries has risen significantly in recent years. This is largely due to the increased populations and their concentrations within urban areas. Human and ecosystem uses. Some parts of the world has already experienced a reduction in resource availability, while others has seen an increase.

The demand for water in the OPT is dominated by three major user groups: agricultural irrigation, domestic use, and industry. Even if no climate change takes place at all, the population growth rate is one of the highest worldwide (3.06% in the West Bank and 3.71% in the Gaza Strip (CIA Fact book,

2007), while that of the world averages 1.14%. A correspondingly rapid growth in agricultural and industrial output will be required to sustain this population which, in turn, will advance the water scarcity problem that is already severe in the OPT.

Agriculture

In the OPT, fruit production is a significant commercial and, to a large extent, a primary source of revenue for agricultural areas. It is extremely vulnerable to damage from temperature extremes, particularly minimum temperature extremes. The following are some expected climate change (directly or indirectly related) impacts on agriculture:

- Increase of temperature and frequency of extreme events will reduce crop yield (some crops are more tolerant than others).
- Modification of mean temperature will induce changes of the agricultural distribution of crops.
- Increase of temperature will negatively affect marginal land and its farmers.
- Scarcity of water resources will force farmers to abandon marginal land, and will increase desertification.
- Socio-economic impacts associated with loss of agricultural and other related jobs, resulting in the increase of unemployment, loss of income, and political disorder.

Sea Level

The Gaza Strip is located along 40 km of the southern coast of the Mediterranean Sea, which is expected to rise due to global warming. This rise will increase erosion along the Gaza Strip beaches. Also, some low lying coastal structures in the Gaza Strip would be affected by this rise. They could be lost and damaged through flooding or erosion, causing a huge loss in valuable lands and buildings and, in turn, forcing the inhabitants of these areas to immigrate. The Gaza Strip is a mere 11 km in width, and will be seriously affected if severe flooding occurs.

Biodiversity

Global warming in the last Century was fast enough that the resultant shifts in species ranges may lead to extensive biodiversity losses (Houghton, 1990). The OPT's biodiversity is considered as one of the 25 recently-defined as "global biodiversity hot spots" (Myerset.al., 2000). The OPT's biodiversity is predominantly rich, as it is positioned at a crossroad between African, Asian and Mediterranean bio geographic regions, each contributing to its different species. The speed and magnitude of climate change may elicit different responses at different levels of ecological organization, namely the population, the species, and the community, as well as the whole ecosystem level.

Human Health

Climate change is expected to have critical impacts on human health in the Middle East in general, and in the OPT, in particular. This is not because of the change itself but also due to the lack of indispensable advanced medical care. Climate change will have both direct and indirect impacts on the Palestinian society.

Direct Impacts

People who suffer from pollen and dust allergies will suffer more by any abrupt change in climate

as the allergy season will start earlier, last longer and become more intense. In the past, the allergy season was starting in May but now it is starting in March (http://www.cbsnews.com/stories/2006/06/30/eveningnews/main1772819.shtml). As a result, an increase in respiratory diseases is expected among children, elderly, and people with chronic diseases. In addition the very young, very old, and very weak are likely to be affected by heat waves and, thus, mortality rates may increase in these groups.

Indirect Impacts

Indirect impacts may appear in the term of diseases that occur from contact with insects and other living organisms. In the case of climate change, attention should be focused on diseases caused by insects, because insects have a shorter life span than other developed organisms. So, the life cycle of these insects will be affected by climate change. Many diseases may spread in the OPT, but the cause of greatest concern is the possible spread of malaria.

Malaria is caused by Protozoan Parasites of the Genus Plasmodium. The malaria parasites are transmitted from one person to another by the female Anopheline Mosquito. The symptoms of the disease are fever, shivering, pain in the joints, and headache. The spread of the mosquitoes depends on the presence of humidity (water). Because of the change in rainfall distribution and rainfall intensity in the OPT (due to the predicted climate change), ponds may form, which increase the available breeding habitat of mosquitoes and, hence, leads to the population's increase. The effects of this phenomenon are expected to be most severe in the Gaza Strip.

11.7 Outlook

Certain measures may be taken early to ameliorate the probable effects of climate change in the OPT. The most severe impacts of climatic change are likely to be in terms of desertification, water resources' scarcity and degradation, and the subsequent impacts of these two phenomena on the agricultural industry and, hence, on food security of the OPT's population.

Desertification

It is well known that desertification (along with urbanization) could have contributed to a small fraction of the overall warming. So, the following are some options considered necessary for combating desertification:

- Forestation in regions of over 100 mm annual rainfall. This will reduce soil erosion and will enhance precipitation at a meso scale level.
- Enhancement of soil moisture and decreasing leakage of water and nutrients.
- Increasing plant productivity and diversity.

Water Resources

One of the essential steps to reduce the adverse impact on water resources' supply in the OPT, is to take appropriate alleviating actions, by introducing more careful and integrated water management, especially for the agriculture sector. Moreover, the most vulnerable area in the OPT must be specified, in order to introduce an effective disaster preparedness strategy.

Agriculture

Agricultural production in the OPT can be fragile and the Palestinian farmers may have to rely on off-farm income to manage any future risk, resulting from climate change. As a result, farmers may move to other more economically secure options. Adaptation and coping with challenges can be achieved by considering the uncertain environment facing most Palestinian producers, which require:

- Predictable governmental programs and reliable resources of weather events' data.
- Publicly funded research programs for reliable and unbiased findings, acceptable by the public.
- Technological advances in irrigation systems and, to a certain extent, genetic modification of plants that tolerate extreme events.
- Viable support systems for high-risk production (e.g., strawberries).

Part Three

National and International Aspects

Chapter Twelve 12

Legal and Institutional Framework

12.1 Overview of Palestinian legal Status

To enhance the protection of the environment and ecology, to guarantee social fairness and justice, to promote economic development, to establish a green Palestine, to promote citizen's 'living standards', and to pursue national sustainable development, a comprehensive legislative framework is needed. However, the legal political status of the Palestinian society is unique and quite complicated. For centuries, different regimes have been enforced by various foreign powers. Laws that are currently valid are more or less those previously issued by successive ruling and colonizing powers. Each administration inherited extant laws, which were applied and later modified. The Palestinian National Authority (PNA) inherited this jungle of laws. The major part of these laws needs updating or changing. In addition, many laws and strategies need to be newly set up for the case of the future state of Palestine. At the same time, the PNA inherited a poor infrastructure in the West Bank and the Gaza Strip after 30 years of Israeli Occupation, which necessitated a huge investment program and an efficient public administration.

During the Israeli Occupation, several laws have been issued for the protection of natural resources. However, those implemented in the West Bank and the Gaza Strip gave Israel the full control over the Palestinian natural resources for claimed security reasons. Over the past eight years, even after signing the various agreements with the Palestinian leadership, the Israeli government has persisted in its expansion of illegal colonies and of land confiscation. This is compounded by the contribution of a series of bypass roads to be used by Israelis only, to link their colonies and to avoid contact with Palestinian communities.

One of the important agreements between the PNA and Israel is the Oslo agreement of May 1994. According to the first paragraph of Article 7 of the agreement, the PNA, as an autonomous political entity, was given the mandate to legislate in the OPT. The Palestinian President (the late Y. Arafat) announced a Presidential Decree No.2 on 17 April 1995 stating, "the PNA would take over all authorities and responsibilities included in the legislation, laws, decrees, and orders in the West Bank and Gaza Strip that were in place before 19th May 1994". In accordance with this, ministries were requested to prepare subjects and elements of relevant laws falling within their jurisdiction according to the interim agreement.

Environmental legislation, policies and planning are the responsibility of the Palestinian Environmental Quality Authority (Previously, the Ministry of Environmental Affairs) in cooperation with other relevant ministerial bodies, such as the Ministry of Planning. Its responsibilities include: (1) the formulation and updates of laws, policies, strategies and action plans to safeguard the environment; (2) to set laws and systems to protect and control the natural reserves and other important natural areas; (3) environmental law enforcement; (4) research and development of protected areas; (5) early warning and plans of combating environmental catastrophes (e.g., forest fires). Accordingly, the Ministry of Environmental Affairs issued the Environmental Law # 7, 1999, and finalized it in 2003. It also issued the Palestinian Environmental Strategy in 1999 and the National Biodiversity Strategy and Action Plan, 1999. The Ministry of Agriculture also finalized the Agricultural Law, 2003, including forestry and rangeland sectors and the Palestinian Agro-biodiversity strategy, 2005. The Environmental Law can be considered the basic law for the environment. However, it lacks many details and specifics, such as environmental quality standards, regulatory standards, economic measures, as well as matters concerning environmental education.

12.2 Plans, Policies and Strategies on Environment

National Environmental Strategy

The PNA has developed a ten-year (2000-2010) environmental strategy document to be updated every three to five years. It identifies and analyzes the causes of current environmental problems. It also defines targets and proposes prioritized measures, required for meeting these targets. The nine priority "environmental themes" set out in the strategy include depletion of water resources, deterioration of water quality, depletion of natural resources, land degradation, air and noise pollution, shoreline and marine pollution, depletion of biodiversity, landscape degradation, and threats to cultural heritage.

National Environmental Action Plan

The PNA adopted a National Environmental Action Plan (NEAP) in the year 2000 as an instrument to translate the general themes and priorities, set out in the national environmental strategy into concrete and prioritized actions and projects for the three year period 2000-2002, with subsequent annual updates. Main issues discussed in the strategy are related to wastewater management, water resources management, solid waste management, agriculture and irrigation managements, industrial pollution control, nature and biodiversity, land use planning, environmental standards and regulations, and monitoring.

Palestinian Environmental Law

The Environmental Law establishes the general legal framework for environmental protection in the OPT. The law was approved in the year 1999 and was divided into five parts, with ten chapters, concerning a wide range of environmental protection and management issues. The law's objectives are: the protection of the environment by preventing all types of pollution; promotion of public health and welfare; preservation of biodiversity; and improvement of those areas, which are environmentally degraded. It also promotes public awareness, and it encourages sustainable resources' development for the benefit of present and future generations on the basis of inter-generational equity.

The environmental law elaborates on environmental impact assessments (EIA), environmental monitoring, licensing, inspection, and the setting of penalties for violations. It outlines the rules and regulations related to a wide scope of environmental issues. The first and third chapters of the second section of the law deal, through several articles, with issues related to solid waste, hazardous substances and waste and wastewater.

12.3 Other Sectoral Policies and Laws Developed by the PNA

Several new policies and laws were developed and adopted by the PNA, such as the Palestinian Local Government Law (1997), Industrial Estates and Free Industrial Zones Law (1998), Natural Resources Law (1999), and Water Law (2002). Of the relevant policies and laws are the following:

- Palestinian Development Plan (PDP) 1999-2003.
- Natural Resources Law.
- Wastewater Management Strategy.
- National Water Policy and Law.
- Agricultural Policy and Law.
- Forest Policy, Strategic Options, and Scenarios.
- National Biodiversity Strategy and Action Plan for Palestine.
- National Policy and Legislation for Promoting the Conservation of Agro- biodiversity in the PNA's Territories.

- The Gaza Coastal and Marine Environment Protection and Management Action Plan.
- Food Security Strategy.

12.4 Gaps Concerning Environmental and Related Laws

The PNA, after receiving control over parts of the West Bank and the Gaza Strip and after establishing the Palestinian Environmental Quality Authority (EQA), took over the responsibility of environmental legislation and environmental strategies' development and planning in the Palestinian Territories. However, all policies and laws that were developed by the PNA need to be better enforced and implemented to get efficient results, concerning the management and conservation of environmental sector in the OPT.

Several gaps were detected, concerning the Environmental Strategy and Law, as well as relevant laws. Some of these gaps are the following:

1. Palestinian Environmental Law # 7 (1999)

The law has a major weakness since it did not take into consideration the economic and social impacts. Therefore, the Environment Strategy Update should focus on specific actions to be undertaken, to shift away from viewing the environment as a separate sector.

In defining hazardous waste, for example, the law neglected two important characteristics of hazardous wastes, i.e. corrosivety and reactivity. The law also did not define toxic materials. Some of the world standards refer to leaching procedure to define toxicity. This means that if a material after washing it with de-ionized water with certain pH value, leaches some of the components with certain concentration, then it is considered toxic. Therefore, the law needs to define the characteristics of toxic materials. The law does not include any procedures for handling hazardous waste.

The "Community-Right-to- Know" principle was not addressed in this law. It should be stated clear that any chemical on sale in the market should be labeled and marked in a clear language and easy to understand by the public on the safety maters and handling procedures for such chemicals. Such procedures should include, at minimum way of opening the container, protective tools required, emergency procedures in case of spill or leak, or being in contact with the human. This is addition to information about the safest way to dispose of what is left over or the empty can.

2. National Environmental Strategy and Action Plan

The strategy does not specify the responsibilities as regards to setting regulations and guidelines for the import and export of hazardous substances. Moreover, the roles of the Ministry of Local Government (MoLG) and the municipal and rural councils are not defined. Though the latter can play a crucial role at source separation of domestic hazardous waste, and the former can hold significant responsibilities in the financing and operation of hazardous waste collection and treatment activities. The MoLG should also facilitate the promulgation of (1) the policies from the EQA to the municipal and the rural councils; and (2) information on hazardous waste generation rates and composition from the municipal and rural councils to the EQA.

The strategies for the management of hazardous substances are inadequate, as they lack the following:

(1) A strategic hierarchy for the management of hazardous waste.
(2) Guidelines and regulations on the international trade of hazardous material.
(3) Guidelines, regulations and related enforcement measures on the import and export of (among others) hazardous waste.

The NEAP proposed four projects of hazardous waste management. However, these projects do not propose any in the field of industrial waste or the treatment of domestic hazardous waste.

12.5 Accomplishments of the Palestinian National Authority (PNA) in the Institutional Environmental Field

The OPT continues to undergo a structural transformation since the establishment of the PNA in 1994. The Palestinian National Plan of Action for Human Rights (NPAHR) forms a timely part of that transformation. Until recently, a mixture of Ottoman, British, Jordanian and Egyptian laws were used. While much of the Palestinian legislation had been made since the establishment of the PNA to reestablish the rule of law and respect for human rights, the Palestinian institutional infrastructure remained weak. Thus, while the environmental legislation in the OPT is quite modern and advanced, there is an obvious weakness in reinforcing these legislation.

The PNA has passed the following environmental legislation:

- Municipal and Local Government Law; # 1 (1997).
- Civil Defense Law; # 3 (1998).
- Industrial Estates and Free Industrial Zone's Law; # 10 (1998).
- Natural Resources Law; # 1 (1999).
- Palestinian Environmental Law; # 7 (1999).
- Palestinian Water Law; (1999, 2002).
- Agriculture Law (2003).

12.6 Institutional Framework

Environmental legislation, policies and planning are the responsibility of the Palestinian EQA, in cooperation with other relevant ministerial bodies, such as the Ministry of Planning.

Other institutions, working on environmental issues, include:

- Ministry of Planning (MoP) and the Higher Zoning Council, responsible for land use planning and regional development plans.
- Municipalities and village councils, largely responsible for the collection, transportation, and sometimes disposal of solid waste at a local level.
- Ministry of Local Governments and Ministry of Health, responsible for solid waste management and medical waste.
- Ministry of Agriculture, responsible for agro-chemical use and protection of nature and biodiversity. The ministry, in cooperation with the Water Authority, is also responsible for rehabilitating the water resources (springs and wells), protecting them from pollution and promoting their economic use in irrigation.
- Ministry of Health (via its department of Environmental Health), involved in the control and management of medical waste, water and food quality, wastewater, solid waste, pests, etc.
- Water Authority (which has published the Water Sector Strategic Planning Study in 1999), responsible for fresh water and waste water management.
- Ministry of Industry, responsible for management and control of industrial pollution and natural resources.

- Ministry of Tourism and Antiquities, responsible for protection and management of cultural heritage sites.
- Ministry of Interior, involved in environmental law enforcement.
- Palestinian Energy Authority, responsible for minimizing emission of energy production and consumption pollutants to air.
- Ministry of Education has a specific role through environmental education and awareness building.
- Several national university are working in the field of environment such as Bir Zeit • University, Al Najah University, Al Quds University .
- Some international civil society institutions working in the field of environment are mainly FAO, UNDP, UNRWA, and UNESCO.
- NGOs have active role in developing the Palestinian environmental sector. The main NGOs are listed in table 12.1.

Table 12.1: NGOs Working in the Field of Environment

Palestinian	• Applied Research Institute-Jerusalem (ARIJ). • Center for Environmental and Occupational Health Sciences (CEOHS) at Bir-Zeit University. • The Community Health Program at Bir-Zeit University. • Arab Studies Society in Jerusalem. • Palestinian Hydrology Group (PHG). • Environmental Protection and Research Institute (EPRI), Gaza Strip. • Palestinian Agricultural Relief Community (PARC). • Water and environmental Studies Center at Al-Najah University. • Children for the Protection of Nature in Palestine (CPNP). • Palestinian Society for the Protection of Nature (PSPN). •Palestine Wildlife Society (PWLS) •Al-Ard Society for Environmental Awareness and Protection •Center for Agricultural Services (TCAS) •Center for Development in Primary Health Care (CDPHC)- Al Quds University •Institute of Water Studies, Birzeit University •Development and Environment Association—Baladna Cultural Center •Land Research Center (LRC) •LAW-The Palestinian Society for the Protection of Human Rights and the Environment •The Local Committee for the Protection of the Environment, Nablus •MA'AN Development Center •Palestinian Association for Cultural Exchange (PACE) •Roads and Environmental Safety Center (RESC) •The Society for Environmental Protection, Jenin •Union of Agricultural Work Committees (UAWC) •Union of Palestinian Medical Relief Committees (UPMRC) •Water and Environment Department-Ramallah Municipality •Water and Soil Environmental Research Unit (WSERU), Bethlehem University •Water and Environmental Studies Center (WESC), An-Najah National University •Palestinian Academic Society for the Study of International Affairs- PASSIA
Israel - Palestinian	• Palestinian-Israeli Environmental Secretariat (PIES). • Israeli-Palestinian Center for Research and Information (IPCRI).
European and American	• Save the Children Federation. • Catholic Relief Services • American Near East Refugee Aid • Friedrich-Naumann Stiftung.

12.7 Palestinian National Plan of Action for Environmental Human Rights

The fact remains that OPT is not only underdeveloped, but occupied by a regime that continues to negate its own internationally-recognized human rights violations. In the midst of the political and social turmoil surrounding the Occupation, the systematic Israeli hindering of infrastructural and social developments has had a direct negative impact on the environment of the Occupied Palestinian Territory. In addition to the physical environmental destruction, associated with occupational military incursions, and destructions including infrastructural damage, house demolitions, building of military bases and checkpoints, and destruction of vast areas of agricultural land in the wake of Israel's Segregation Wall, Israel has continued land confiscation policy and its illegal use of the West Bank's territories. This is not only for residential purposes, but also for the ever increasing relocation of Israeli industries, many of which have been prevented from operating within Israel, due to environmental concerns.

In the process of establishing a Palestinian State, the PNA has committed itself to formulating a Palestinian National Plan of Action for Human Rights (NPAHR) to be agreed upon by relevant governmental and non-governmental parties. This Action Plan is another building block towards statehood that aims to serve as a tool for Palestinian political leaders and decision makers to advance Palestinians enjoyment of improved living conditions and general quality of life in all spheres. Accepted environmental and human rights principles embody the right of every one to a secure, healthy and ecologically sound environment.

The PNA and, in particular, its EQA are responsible for promoting and implementing a sustainable development for the OPT. It is essential to recognize that humans and the natural environment are interdependent and, hence, their relation is inseparable. Respect to the human rights means respect to the surrounding environment. However, Palestinians alone cannot uphold environmental human rights while Israel continues its current policies of aggression against humans and the environment. Consequently, the environmental human rights action plan should be presented under two main headings. The first is directed towards the Israeli authorities and the second towards the PNA.

Proposed Action plan Related to Palestinian Environmental Human Rights

Establish a national commission for sustainable development that should consider respect of human, environmental, social, and cultural rights. The commission needs to include relevant ministries, NGOs and the private sector. A proposed action plan might include the following:

- Ensure that the exploitation of Palestinian natural resources should be in a sustainable manner.
- Promote economic development, in harmony with the protection and conservation of the environment, including preservation of ecological balance and safety of human health and well being.
- Environmental issues are best handled with the participation of all concerned citizens and social sectors, at the relevant levels.
- Develop and use environmental management tools, such as environmental impact assessment, environmental risk management, and monitoring programs for domestic and trans-boundary impacts.
- Strive for capacity building and human resources development, through environmental training and education.
- Facilitate and encourage public awareness to broaden the basis for enlightened opinions and responsible conduct by individuals, enterprises and communities in protecting and improving the environment.
- Endeavor to promotion and internationalization of the costs of the environmental damage and the use of economic instruments, taking into account the approach that the polluters should bear the cost of pollution, with due regard to the public interest and without distorting investment opportunities.

- Right to environmental education, especially at an early age, has a significant effect on how people form attitudes towards the environment.

- Protecting and promoting environmentally human rights require the protection and conservation of the Palestinian environment.

12.8 Outlook

Previously, development plans were designed based only on economic considerations. Deterioration in environmental conditions and depletion of national resources were common consequences of such planning schemes. Only recently have environmental and/or social issues begun to be taken into consideration when planning for national and local development. By incorporating such issues into economic development planning, such as through the use of environmental impact assessment for new development projects, a different perspective can be given to natural resources. The value of the preservation of such resources begins to be taken into account.

Numerous environmental problems exist as a result of the disengagement of economic, social and environmental considerations in development planning. For example, the depletion of water resources is the prime cause of desertification, decrease in agricultural production, and increase in the rate of migration from rural to urban centers. Deterioration in the quality of renewable resources and the depletion of the non-renewable resources limit the ability for long term planning (for next generations) and increase prices in the short term. Such faulty planning often has extremely long-term environmental deterioration effects.

However, the OPT finds itself in a unique situation, since it is in the process of formulating development plans for the different socio-economic sectors. Based on the recommendation formulated in the ARIJ's project (localizing Agenda 21, 2000), the PNA should focus on the following aims:

- Integrating environment and development, at the policy planning and management levels.
- Providing an effective-legal framework.
- Making effective use of economic instrument.
- Establishing systems for integrated environmental and economic accounting.
- Localizing agenda 21 at local level.

Thus, changes in the Palestinian national policies, strategies, and actions towards protecting and preserving the environment while maintaining efficient and integrative development in the use of environmental resources and conservation, (in regard to water, land, air, energy, etc), are urgently needed.

Bethlehem 21 project entitled "Environmental Sustainability for a Better Life: An Integrated Approach for Localizing Agenda 21 in the Bethlehem Governorate" is a Palestinian initiative responding to Chapter 28 of Agenda 21 whereby local authorities are called upon to undertake a consultative process to develop and implement a "Local Agenda 21" for and with their communities.

The participatory approach will be in the form of a visioning process that focuses on bringing together a broad section of the community with the local authority to develop a shared vision for the sustainability of their community and plan how to achieve it.

The project is implemented by the Applied Research Institute - Jerusalem (ARIJ) in partnership with the Centro Regionale d'Intervento per la Cooperazione (CRIC).

Chapter Thirteen 13

International Cooperation

13.1 Introduction

The Oslo Agreement required Israel and PLO to 'adopt, apply and ensure compliance with internationally recognized standards' on the environment, Since 1995, OPT has been allowed to participate, in most activities of international environmental governance bodies, although Palestine still cannot technically ratify or accede to Multilateral Environmental Agreements (MEAs), until it achieves internationally-recognized, independent, sovereign statehood. For several reasons, it is important for Palestine to continue to strategically examine and pursue its international environmental agenda, including implementation of major MEAs, before achieving this status:

- Going through the process of evaluating the prospects for Palestinian compliance with the major MEAs will bring the areas of most severe environmental degradation into sharp relief, and will lend focus to current Palestinian efforts on environmental remediation.

- Studying the wording and goals of each MEA will stimulate and facilitate improvements in Palestinian Environmental law, which must be updated to continue to provide meaningful guidance for Palestinian civil society and the private sector.

- Framing environmental issues, in terms of compliance with established international treaties, will inspire increased funding to Palestinian environmental authorities on the part of member nations of these treaties.

- Preparing grievance reports to be submitted to the dispute resolution mechanisms of the MEAs ratified by Israel,(such as the Basel Convention on hazardous waste) will allow Palestine to more successfully pursue claims for redressment of these grievances and reimbursement for Israeli violations of Palestinian environmental rights.

- Readying proposals and applications for accession to applicable MEAs will allow Palestine, upon achieving political independence, to immediately qualify for the financial and technical assistance guaranteed to developing nations by many of those agreements.

- Publicizing Palestinian viewpoints on current international discussions about environmental issues will promote a sense of solidarity between public servants and environmentalists in Palestine and their counterparts abroad that transcends political differences.

- By publicly and openly exploring the possibility of ratifying international environmental agreements, Palestinians will proclaim to the world that they are interested not only in the political and economic benefits of independent statehood, but als in the responsibilities associated with joining the international community of nations.

13.2 Researching Relevant MEAs

When preparing to implement multilateral treaties, or considering that option, it is important for the Palestinian environmental leadership to research the specifications of these agreements, in light of the Palestinian situation, and to decide which are worth striving for. To this end, the Environmental Quality Authority (EQA) should set up an exploratory committee, with the participation of representatives from Palestinian NGOs. This committee will establish contact with the secretariats of the agreements in question, and invite representatives from these secretariats or their implementing bodies to attend and

offer presentations on the costs and benefits of participation. As apart of that process, the committee members should consider their answers to the following questions that address applicability, compliance, and political considerations:

Applicability

- Does the MEAs address the environmental concerns that are applicable or relevant to Palestine? For example, the "United Nations Convention to Combat Desertification" would be considered relevant. Desertification is a major concern in Palestine due to its impact on livestock and crops. In contrary, the "Convention on the Conservation of Antarctic Marine Living Resources" would not be considered particularly relevant, because Palestine does not engage in activities in the Antarctic that affect marine life in that region.

Compliance

- Are the stated goals of the MEAs mostly expressed qualitatively or quantitatively? Qualitative goals are almost always weaker than quantitative goals. For example, the "Convention on Biolocal Diversity (CBD)" does not contain any specific targets for reducing the rate of species' loss regionally or worldwide, though such a reduction is a major goal of CBD. The Kyoto Protocol, on the other hand, mandates that states (developed countries) reduce their domestic emissions from 1990 to 2012 by specific targets (for example, -6% for Canada, -5% for Croatia, etc.).

- Are the stated requirements of the MEAs mostly expressed vaguely or specifically? Vague requirements are almost always weaker than specific requirements. For example, the "Forest Principles Document" recommends that countries sustainably manage their forest resources, share information, and build national action plans, but contains few suggestions on how to accomplish these tasks. However, the "Montreal Protocol" contains specific lists of the Ozone-Depleting Substances within its annexes, as well as instructions for how exactly countries should restrict their use, import, and production.

- Does the MEAs' text provide for monitoring and/or auditing of member states' compliance with the dictates of the treaty?

- In case of a member state's failure to comply with the treaty, does the MEAs' text provide for sanctions?

Political Considerations

- Does the MEAs allow for states to publish official reservations or declarations upon accession? For example, the Syrian Arab Republic used the "Stockholm Convention" ratification process to declare that in no way could its ratification be construed as an implicit recognition of the State of Israel, or require Syria to officially deal with representatives from the State of Israel. These declarations/ reservations are possible vehicles, by which Palestine could draw attention to Israeli environmental violations. However, many MEAs' texts (seeking to avoid being used by member states as tools for making political statement) forbid or limit such reservations.

- Does the MEAs set up a specific avenue for resolution of disputes over the implementation or interpretation of the treaty? For example, the "Basel Convention" suggests various means for dispute resolution, including bilateral negotiation or mutual appeal to the International Court of Justice (ICJ), but these options are not binding upon member nations.

- Does the MEAs provide for financial assistance for developing nations to help them realize their committed goals?

- Does the MEAs provide for technical assistance or transfer of technology to developing nations to help them realize their committed goals?

- Is the MEAs generally judged to have been effective so far in its implementation, both in terms of achieving its stated goals and of alleviating the environmental problem it sets out to combat?

These questions should be answered and considered collectively in order to compile a list of the most desirable MEAs from the Palestinian perspective.

13.3 Relevant Multilateral Environmental Agreements (MEAs)

United Nations Convention to Combat Desertification (UNCCD) In countries experiencing serious drought and/or desertification, particularly in Africa

Negotiated in 1994 and put into force in December 1996, the UNCCD aims to facilitate coordination and partnership between the member countries to help reverse land degradation on a national level. The ratifying countries commit to providing special assistance and to funding the least-developed nations and those experiencing particularly serious desertification. The treaty also requires that attention be paid to socio-economic causes and effects of desertification, in addition to purely environmental considerations. The final report of the seventh "Conference of the Parties", held in Nairobi (Kenya) in 2005, acknowledges that the convention has yet to make it substantially easier for countries already struggling with endemic poverty to fight desertification and land degradation. Countries are not allowed to submit reservations to UNCCD upon ratification or accession.

Palestinian considerations

- **Upon accession to the Treaty, Palestine would agree to:**

  - Give 'due priority' to combating desertification, including allocating sufficient resources.
  - Establish strategies for combating desertification, including an open and transparent national action programme.
  - Tackle the 'underlying causes of desertification, 'including socio-economic causes.
  - Form partnerships with NGOs and local organizations, especially involving women and youth.
  - Reform or create legislation to deal with desertification on an institutional level.
  - Conduct a comprehensive, interdisciplinary review of the effort to combat desertification within the country.

- **Upon accession to the Treaty, Palestine would qualify for:**

  - 'Substantial' financial assistance from developed nations, in the form of grants, concessional loans, and increased funding from the Global Environmental Facility (GEF).
  - Information and technology exchange for combating desertification, such as climate monitoring to predict drought
  - Membership in the Kyoto Protocol's "Conferences of the Parties", which is an opportunity to voice uniquely Palestinian concerns and viewpoints on the global fight to combat desertification

United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol

The Kyoto Protocol, negotiated in 1997, is the first MEA to make a concerted effort to reduce greenhouse gas emissions. Kyoto targets are legally binding, unlike the stipulations of its predecessor (UNFCCC). As a result, fewer countries are willing to ratify Kyoto, including the world's largest greenhouse gas emitter; the USA. The Kyoto Protocol sets stringent requirements for industrialized nations, called 'Annex I Countries'. Annex I Countries can meet their targets by reducing domestic emissions or by supporting clean, sustainable development projects in non-Annex I Countries that demonstrably reduce emissions there. If Annex I countries (including Germany and Japan) fail to meet reduction targets, they may buy or trade emission credits, or are otherwise subject to fines and an increase in reduction targets, as agreed upon at the seventh Conference of the Parties. Non-Annex I Countries, including China and India, agree to the sentiments expressed in the Kyoto Protocol, but do not have legally-binding reduction targets. Among the criticisms routinely leveled at Kyoto is the failure to include China and India among the Annex I Countries, as well as a general belief that the Kyoto standards are not strict enough to prevent disastrous climate change on a global scale. Reservations are not permitted under the Kyoto Protocol.

Palestinian Considerations

- **Upon accession to the Kyoto Protocol, Palestine would agree to:**

  - Participate, along with other Parties, in regular review of the Protocol to ensure that it reflects the most accurate scientific, technical, social and economic information.
  - Attempt to establish procedures and institutions for monitoring of greenhouse gas contributions.
  - Formulate programs aimed at mitigating, and adapting to, the effects of global climate change.

- **Upon accession to the Kyoto Protocol, Palestine would qualify for:**

  - Support funding and planning for sustainable development projects in Palestine (from the Annex I Countries) through the Kyoto Protocol's "Clean Development Mechanism".
  - Membership in the 'Conference of the Parties', with a voice on implementation and management of the Protocol.

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and its Disposal

This one of MEAs, which entered into force in 1992, requires agents of hazardous waste disposal to obtain prior informed consent from the authorities of the dumping sites. The convention acknowledges that domestic law of a particular country may regard a substance as hazardous waste, even if the Basel negotiators did not include it in the list of controlled wastes, and provides for the restriction on trade of such substances, as well. In 1995, an additional amendment was signed to entirely ban the shipment of hazardous waste from developed countries to developing countries. This 'Basel Ban Amendment' has been ratified by only 62 countries, and has not yet gone into force. Reservations are not accepted under the Basel Convention.

Palestinian Considerations

- **Upon accession to the Basel Convention, Palestine would agree to:**

  - Establish national legislation, defining hazardous waste, and in form the Secretariat of the requirements of this legislation.
  - Refrain from exporting to member nations any waste products defined by those nations as hazardous.

- Take steps, domestically, to reduce generation of hazardous waste and improve the management and disposal of such waste from an environmental standpoint.
- Establish appropriate bureaucratic procedures, including a uniform labeling scheme, for the transport of hazardous waste.

• Upon accession to the Basel Convention, Palestine would qualify for:

- Possible financial or technical assistance from other nations, though this would occur on a strictly volunteer basis.
- The right to refuse import of hazardous waste from other nations.

Stockholm Convention on Persistent Organic Pollutants (POPs)

In 2000, negotiations were completed on the Stockholm Convention, which banned or severely restricted the production, import and use of the specific chemicals listed in Annexes A and B of the Treaty. The Convention entered into force in May, 2004. POPs are considered a global environmental issue due to their high toxicity and ability to persist in the environment for decades. Many of the compounds migrate to the Earth's poles through precipitation cycles and bioaccumulate in arctic wildlife. The Convention also provides for information sharing between the member nations, as well as technical and financial assistance for those who require it. No reservations are permitted under the Stockholm Convention.

Palestinian Considerations

• Upon accession to the Stockholm Convention, Palestine would agree to:

- Restrict or ban the export, import, trade, and manufacture of chemicals listed in the annexes of the Convention, as applicable to the Palestinian situation.
- Develop an 'action plan' to address implementation of the Convention and to deal with releases from unintentional production.
- Articulate strategies for remediating contaminated sites and chemical stockpiles.
- Promote awareness on POPs, especially among policy and decision makers.
- Report to the Secretariat on progress made in implementation of the Convention.

• Upon accession to the Stockholm Convention, Palestine would qualify for:

- The right to request exemption for specific chemicals from Stockholm requirements, as applicable to the Palestinian situation.
- Information exchange on POPs and their alternatives.
- Technical and financial assistance provided by developed nations and other sources on a voluntary basis.

Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer

In response to proof of the growing man-made holes in the planet's Ozone Layer, and the growing risk to agriculture and public health on a global level, the Montreal Protocol was signed in 1987. The earlier Vienna Convention had established, with great difficulty, a precedent for international cooperation on the issue, and the more flexible and specific Montreal Agreement went into force in 1989. Since written, the Protocol has been adjusted to put the phase-out of Ozone-Depleting compounds on a faster track to

completion. It has also been formally amended to include new substances, but convincing nations to ratify the amendment has proved more difficult than convincing them to ratify the Protocol itself. Still, the Vienna Convention and Montreal Protocol are almost certainly the most successful MEAs in history. Many environmental scientists predict that the hole in the Ozone Layer will be completely closed by the mid-21st Century. Of special interest to Palestine might be the restrictions on use of methyl bromide and other substances that help in depleting the Ozone Layer.

Palestinian Considerations

- **Upon accession to the Vienna Convention and Montreal Protocol, Palestine would agree to:**
  - Reduce, by the target dates specified, the consumption of the Ozone-Depleting substances listed, such as chlorofluoro carbons or bromochloromethane, in the Annexes to the Convention and the Protocol.
  - Restrict trade of said substances.

- **Upon accession to the Montreal Protocol, Palestine would qualify for:**
  - Possible financial assistance through the financial mechanism of the Convention and the Protocol.
  - Transfer of technology and information sharing.

Convention Concerning Protection of the World Cultural and Natural Heritage (WCNH)

The purpose of WCNH is to maintain a list of the world's most precious sites of cultural and natural heritage, and to provide a limited amount of funding, through the World Heritage Fund, for their maintenance as well as for public awareness. WCNH stipulates that World Heritage sites belong to humanity as a whole, and should be monitored, cared for and preserved as such. Although Palestine, as an unrecognized state, is not a party to WCNH, the Old City and Walls of Jerusalem have been added to the WCNH list on Palestine's behalf by Jordan.

Palestinian Considerations

- **Upon accession to the World Heritage Convention, Palestine would agree to:**
  - Set up bureaucratic procedures for the identification and monitoring of World Heritage sites, and administration of WCNH funds.
  - Endeavor to incorporate World Heritage sites into the life of their surrounding communities, and increase public awareness of their importance.
  - Agree to avoid acting in a way which might endanger the cultural or natural heritage of Palestine.
  - Pay a certain amount of money to the World Heritage Fund; a sum not exceeding 1% of Palestine's total contribution to UNESCO (United Nations' Educational, Scientific and Cultural Organization).

- **Upon accession to the World Heritage Convention, Palestine would qualify for:**
  - Possible funding from the World Heritage Fund to maintain or recondition World Heritage sites.
  - International assistance for training of staff and specialists in the protection, conservation, or rehabilitation of sites of cultural or natural heritage.

Convention on Biological Diversity (CBD) and the Cartagena Protocol on Biosafety (CPB)

In addition to its main goal of conserving biological diversity and guaranteeing the sustainability of its exploitation, the CBD seeks to regulate use and ownership of the bonanza of genetic resources that

otherwise would go straight to those with the capacity to discover them (i.e., the wealthiest and most technologically advanced nations). On the other hand, the CPB, a supplement to the CBD, seeks to protect developing countries from biosafety concerns. For example, the CPB affirmstherightofamember nationtorefuseentrytogenetically-modifiedfood imports.

Palestinian Considerations

• Upon accession to the CBD and CPB, Palestine would agree to:

- Formulate an updated national strategy or plan for addressing biodiversity issues within Palestine.
- Complete background work on biodiversity, by identifying and monitoring areas of crucial importance or pressing danger, and develop guidelines for the administration of these areas.
- Establish a bureaucracy capable of management of biodiversity issues, and enact specific and relevant legislation to provide guidance and structure for this bureaucracy.
- Encourage public awareness of biodiversity concerns, stimulate research, and provide training to professionals in the field.
- Create an atmosphere that fosters 'access to genetic resources for environmentally sound uses' by other member nations.

• Upon accession to CBD and CPB, Palestine would qualify for:

- Financial or technical assistance from other nations, exchange of information, and distribution of benefits from biotechnology (theoretically).
- Exchange of information on biodiversity, as well as the latest science on 'living modified organisms', incompliance with the CPB.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

A small secretariat with limited funding, the CITES seeks to regulate international trade of endangered species, as uncontrolled smuggling and trade can often threaten the survival of rare flora and fauna. Over 30,000 species of plants and animals are given protected status by CITES.

Palestinian Considerations

• Upon accession to CITES, Palestine would agree to:

- Strictly control import and export of all species listed in the Annexes in accordance with the specific requirements of the Treaty.
- Return controlled species to their states of origin, in the case of confiscating illegally traded species.
- Designate a national authority for management of the Treaty.

• Upon accession to CITES, Palestine would qualify for:

- Submission of a list of species, whose international trade requests CITES to restrict, subject to the acquiescence of the Conference of the Parties.
- Membership in the Conference of the Parties, with a voice on implementation and management of the Treaty.

Convention on the Conservation of Migratory Species of Wild Animals (CMS, Bonn Convention)

In an attempt to further conserve species of wild animals that are endangered in some way, member nations committed in 1979 at Bonn (Germany) to cooperate in research activities and to work together

on the regional level for the conservation and management of migratory species. It is a framework convention, under which multiple agreements, each with specific conservation goals, are organized. Nations may be party to any number of these agreements. Some nations, like Algeria, are parties to CMS but have not signed or ratified any agreements. Others, like Lebanon, are not parties to CMS but have signed agreements. General reservations are not allowed under the Bonn Convention, but member nations may make specific reservations about the contents of the appendices of migratory species judged generally to have an unfavorable conservation status.

Palestinian Considerations

• Upon accession to CMS, Palestine would agree to:

- Take immediate action to preserve conservation status of migratory species ranging through the OPT
- Research and join 'agreements,' under the authority of CMS, to protect one or more specific migratory species.

• Upon accession to CMS, Palestine would qualify for:

- The right to appoint a representative to the Scientific Council.
- The right to enter 'reservations' on inclusions of specific species into Annexes I or II.

Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)

The Ramsar Convention, signed at Ramsar (Iran) in 1971, aims to catalogue and preserve wetland areas all over the world, as a means of promoting environmental health and sustainable development. It provides means for international cooperation, as well as action on the national, regional and local levels. Palestine, as an unofficial State, is ineligible for participation, but unlike the case with the World Heritage Convention, has been unable to arrange for its important sites to be protected through a proxy nation.

Palestinian considerations

• Upon accession to the Treaty, Palestine would agree to:

- Precisely map the wetlands on the Palestinian Territory and designate them for inclusion in 'the List of Wetlands of International Importance'.
- Monitor the conservation status of wetlands on 'the List of Wetlands of International Importance' and maintain ecological pressure.
- Encourage research on wetlands ecology and train personnel for wetlands management.
- Contribute a percentage of the 'Conference of the Parties' budget, proportional to its percentage of the UN budget.

• Upon accession to the Treaty, Palestine would qualify for:

- Membership in the 'Conference of Parties' and to advance Palestinian viewpoints and goals.
- Small grants for wetlands conservation projects, to be awarded by the Ramsar Administrative Authority.

13.4 Outlook

The Environmental Quality Authority (EQA) must give priority to its representation at international conventions and conferences, especially 'Conference of the Parties' on MEAs relevant to Palestine, such as UNCCD and CBD. Despite the Palestine's official inadmissability to any international agreements or treaties, the environmental sector in Palestine needs to begin cultivating personnel and institutions with the expertise necessary to navigate the international environmental system, especially with regard to negotiation of new agreements and resolution of disputes over old agreements. There is no better way to accomplish this than to attend these conventions as observers, develop personal and professional relationships with representatives of other countries, and exchange Palestinian concerns and viewpoints with the sympathetic international community. Finally, the Palestinian National Authority must set up the bureaucratic machinery that will be required to comply with MEAs' regulations. Again, this does not necessitate the formation of a new environmental authority within the Palestinian government, which is an expanded role for the EQA, if planned and executed properly, will suffice. The EQA, together with implementing authorities, will pursue four main goals relative to its agenda on international cooperation:

1) Set up a centralized and organized monitoring system for environmental problems across Palestine. The Palestinian Central Bureau of Statistics already monitors various indicators for local environmental challenges, such as solid waste collection and wastewater treatment. Sorely lacking, however, is a national authority to establish monitoring capabilities for issues such as national Greenhouse Gas Emissions, import/use of Persistent Organic Pollutants, Emissions of Ozone-Depleting Substances, etc. Together with the monitoring capabilities, a central and standardized database must be set up to store and access this information. Of course, in accordance with the Aarhus Convention 'Establish institutions for public access to environmental information, for public feedback, and for enforcement of people's environmental rights', this database should be made open to the public. Compliance with international treaties relies upon monitoring and enforcement. This is an essential step toward Palestinian integration into the international environmental community.

2) Launch a public relations campaign dedicated to communicating information about the conditions of the environment in Palestine, attempting at remediation and multilateral relations. The campaign should target environmental professionals, career diplomats, UN bureaucrats, and others, who could help pave the way for an increased Palestinian role in treaty negotiation and governance. Palestine's commitment to environmental justice and rights should be emphasized, as well as the plight facing remediation efforts, especially in the Gaza Strip. The campaign should also target members of the academic and professional community in Israel, who work in ecological or agricultural fields, using the language and terminology of sustainable development.

3) Continue to strengthen the National Environmental Action Plan, in order to provide clear goals and strategies on the environment for the NGOs and the Palestinian Authority. Ministry of Environmental Affairs (MEnA) published a document in 1999 entitled "Palestinian Environmental Strategy (PES)", followed in 2002 by the "National Environmental Action Plan (NEAP)". Other action plans with narrower focus also exist, such as the National Biodiversity Strategy and Action Plan for Palestine (1999), the "National Policy and Legislation for Promoting the Conservation of Agrobiodiversity in Palestine (2005)", and the "Emergency Natural Resources Protection Plan (1998)". These plans provide a good basis for action, but an up-to-date and comprehensive NEAP is needed in Palestine to reflect new environmental realities, especially with respect to the deteriorating conditions in the Gaza Strip following the Israeli "withdrawal" and subsequent reinvasion in 2005-2006. The EQA is currently working on stregthening NEAP; the importance of international cooperation to the Palestinian environmental cause must be stressed.

4) Begin informal implementation of relevant MEAs, especially those addressing sustainable development issues in Palestine. Until Palestine gains sovereignty over its borders and recognition as a State, the environmental authorities can pursue their goals at a pace appropriate for Palestine, not subject to international enforcement. This is an ideal time to begin implementation, which includes legislation, monitoring, capacity-building and enforcement, in order to ease the transition once Palestine becomes formally responsible for compliance. Furthermore, taking on these environmental responsibilities, before even becoming a State, sends a powerful message that Palestinians are eager to participate in the international community, including the field of global environmental governance.

Chapter Fourteen

14

Sustainable Development and Viability of a Palestinian State

14.1 Introduction

In recent decades, increasing attention has been internationally directed towards the need for sustainable development. Global warming, arms proliferation, land degradation, escalating poverty, the energy crisis, species extinctions, and spiraling population growth are all factors which have shifted people's attention towards the environment.

Sustainability can be defined by the often quoted Brundtland Commission "Our Common Future", which was held in 1987 and did much to popularize the concept of sustainability (Dilworth, 1994). According to the Commission, "sustainable development is the development that meets the needs of the present, without compromising the ability of future generations to meet their own needs" (Brundtland, 1987).

The growing significance of sustainability is reflected in the emergence of regular UN summits over the decades since the Brundlant Commission, which have undertaken initiatives to tackle large scale environmental problems. Some significant summits include Rio-1992, Kyoto-1997, Johannesburg-2002, and the Millennium Summit-2005 (Hens and Nath, 2003). Over this time the concept of theory and practice of sustainable development has evolved into a system of thought, emphasizing the significance of the environment and its conservation, as a fundamental component of social development and human well-being.

Concerning the Occupied Palestinian Territory (OPT), the environment has become severely degraded after decades of the Israeli Occupation. The unsustainable exploitation of natural resources and the Israeli geopolitical ambitions in the West Bank, such as building settlements and roads, as well as the Segregation Wall, and conducting military incursions, have all destroyed the vital infrastructure and have damaged the Palestinian environment.

14.2 Environmental Rights, Disengagement and Sustainable Development

The OPT exists in a unique context of Occupation, whereby development possibilities are being fundamentally determined by the geopolitical interests of an Occupying Power (which is Israel). Sustainable development in the OPT will be inhibited by environmental constraints, as well as by the ongoing process of disengagement, which is resulting in increased fragmentation of the Palestinian space and in the appropriation of the OPT's resources. Since the failure of the Camp David talks (in 2000), the Israeli Government has increasingly moved away from a negotiated settlement and cooperation with the Palestinians to unilateralism, utilizing this as a means to dictate permanent status' negotiations and economic conditions, overwhelmingly in Israeli's favor.

As Israel has attempted to diverge itself from the Palestinian people living under its military Occupation, while simultaneously continuing its colonial expansion in the OPT, the Israeli disengagement in its current form is less about handing over sovereignty, but a reorganization of military Occupation. Israeli tactics are systematically segregating Palestinians into isolated enclaves and are separating them from vital resources by the presence of settlements, bypass roads, the Segregation Wall, and closed military zones.

The Israeli "withdrawal" from the Gaza Strip in 2005 heralded a shift in Israeli policy, whereby Occupation would no longer be dictated by a direct military presence to facilitate policing and control. By fencing in Palestinian communities, controlling their vital resources, and maintaining control of entry and exit points, the Israeli army can far more efficiently control the Palestinian population. Instead of relaxing movement restrictions in the OPT, the policy of internal closure has increased, while access to the Gaza Strip has been further restricted as a result of declining security in the region.

Economic reforms in Israel have further eliminated the need for Palestinian labor, and hence, Israel is currently able to source most of its cheap labor from elsewhere. Since the Second Intifada, economic conditions in the OPT have deteriorated significantly. Due to the deteriorating political situation in the OPT, just during the last five years close to 56% of the 150,000 Palestinians used to work in Israel and its colonies in the OPT found themselves out of work. In addition, the Israeli Segregation Wall is just one of Israel's severing economic ties with the OPT, while maintaining Israeli access to Palestinian domestic markets.

A wide variety of measures to promote sustainable development currently exist and have been presented, whereby implementation will have significant benefit to Palestinians. However, none of these sufficiently go to the root causes of the OPT's environmental and social problems. The Israeli Occupation remains the fundamental constraint to sustainable development and the main cause of environmental destruction. This raises the question that sustainability is not possible under Occupation.

Attempting to implement sustainable development in the OPT should remain a high priority. However, without the emergence of peace based on justice, little progress can be expected to be made. In this respect, what will appear to be "sustainable development" will be largely for the purpose of staving off humanitarian crises and not for the purpose of providing the foundations for a future Palestinian State. Furthermore, continued international aid, while vital for the well-being of Palestinians, is effectively releasing the Israeli financial burden. Israel would, otherwise, have to pay for its military Occupation.

The aggressive policies maintained by the Israeli Occupation through, for example, disengagement are fuelling the ongoing conflict, preventing economic revival, as well as systematically undermining the viability of a future Palestinian State. Without geographical continuity, access to sufficient water and productive land, the viability of a Palestinian economy will be highly restricted. Without a viable economy, the Palestinian National Authority (PNA) will continue to be inhibited in funding and maintaining public infrastructure and social services. Lack of environmental sovereignty will perpetuate the ongoing inability for Palestinians under Occupation to sufficiently manage their natural resources. Climate change and increased desertification will add additional pressures on biodiversity and the viability of the farming sector. Continued population growth will contribute to exacerbating the lack of open areas, to increase urban densities, to encroachment of farming lands, and to additional pressures to absorb waste. Without access to jobs, services and the chance for a better future, the Palestinian society can be expected to become more volatile and exacerbate disillusionment with the already failing peace process.

Environmental rights lie at the heart of the Palestinian-Israeli conflict. As long as Israel fails to respect Palestinian environmental sovereignty and their right to self-determination, the capacity for viability and sustainability in the OPT will be highly limited. As the Occupation continues, the institutional, ideological and practical environmental foundations for sustainable development are becoming increasingly distant. Economic decline, the conflict, the inability for the PNA to effectively govern, and the scarcity of sufficient resources have all led to a growing disfunctionality in the Palestinian society. This has been marked, unfortunately, by increasing lawlessness, especially in the Gaza Strip and by growing rivalries between Palestinians.

The expansion of the NGOs' sector indicates wider changes within the Palestinian society, as a result of the influx of foreign aid. The subsequent social elites, which have arisen, pose the risk that the struggle for liberation and the rights of ordinary people will be subsumed to the preservation of their own power bases and financial interests.

14.3 Viable Palestinian State

Assessing the current social, economic and political conditions in the OPT, the following **core requirements (viability elements) for a viable Palestinian State** can be identified:

1) Geopolitical Cohesion: The level of fragmentation, taking place in the OPT, has already caused great social, economic, and political implications. So, geographical cohesion will form an important step towards a Palestinian State. Thus, the greater the geographical continuity the OPT to possess, the more the chances the OPT to become a viable state.

2) Disengagement: For disengagement to bring about positive outcomes, it must satisfy certain components to allow for viability. In this respect, the Israeli disengagement must incorporate removal of internal closures within the OPT; the creation of a secure and reliable economic links between the West Bank and the Gaza Strip; and the establishment of secure, independent borders between the OPT and Israel. The OPT's case seems to be, unfortunately, different, as the current Israeli disengagement practices ensure that the OPT remains isolated and fragmented.

3) Environmental Sovereignty: This factor is highly significant, particularly in regard to the OPT's capacity for sustainable development. Systematic denial of environmental sovereignty by Israel has severely prevented the Palestinian authorities from addressing many of the growing environmental problems in the OPT and from initiating projects towards sustainability.

4) Natural Resources: Without sovereign control over the Palestinian natural resources (with water resources on top of the list), the OPT will be unable to implement comprehensive environmental and otherwise managements. Sufficient natural resources will be vital, in order to provide the basis for social and economic developments. Given the unique conditions currently existing in the OPT, the natural resources will play a strong determining role in having a viable Palestinian State. This will dictate the need for the OPT to increase self-sufficiency, and to have a higher dependency on its natural resources.

5) Economy: It is clear that the economic relationship between Israel and the OPT has been characterized by an overwhelming Israeli dominance of the Palestinian economy. The Israeli Occupation and closures have essentially enabled Israel to control the Palestinian economy according to Israel's own geopolitical interests. Having said that, a strong and independent economy, with the international community's support, will create the conditions for a viable Palestinian State. Economic viability will be vital to ensure genuine independence, and to address the high poverty levels currently existing in the OPT. Economic self-sufficiency will be a crucial component of the OPT's capacity for self-determination.

6) Stable Democratic Government: The OPT's institutional and governmental frameworks lack the ability to effectively govern. The Palestinian National Authority (PNA) continues to be plagued, by factional infighting, as well as allegations of corruption and nepotism. In addition, the PNA suffers from donor aid uncertainty and systematic attempts by the Israeli Occupation to undermine it. Crippled economy in the OPT, as well as the Israeli increasing pressure on the PNA, by arresting key cabinet ministries and members of Palriament, all have led to further complications in the situation on the ground, and in more hardships on the Palestinian population in the OPT. In view of these conditions, a stable democratic government is certainly and urgently needed for a viable Palestinian State.

7) Effective Governance: Effective and stable governance is a necessity for a variety of reasons, including effective economic planning, security and provision, as well as environmental management. Effective governance will be vital to ensure political stability and security, which is necessity for the improvement of social and economic conditions in the OPT. Continued economic uncertainty in the OPT has precluded a lucrative tourism industry, inhibited private investment, and has arguably instilled doubts in the minds of donor states, regarding the value of funding, particularly in the Gaza Strip, where infrastructure is routinely destroyed during the Israeli incursions.

8) Essential Improvements: These include improvements in infrastructure, security, and the continued support of donor states. For example, public infrastructure needs upgrading, including municipal waste disposal, connection to public sewage network, telecommunications, water, health, education and electricity services. Much of the OPT's vital services, such as water and electricity, are currently provided by Israel, which adds to the Palestinian concerns an extra level of dependency on Israel.

14.4 Sustainable Development Strategies

The goal of a sustainable Palestinian State will require careful planning, with a clear long-term vision of what kind of society that people desire. For sustainability to succeed, a new kind of awareness and imagination is required on the part of the PNA, individuals and donors, in order to perceive sustainability in an entirely different manner than has been done in the past. For this reason, education and greater awareness should form the first step towards sustainable development.

Unsustainable population growth will be one of the most difficult issues for the OPT to overcome. There are a number of strategies which may be adopted to overcome the OPT's spiraling population growth rate. Primarily, promoting economic growth, social development and raising living standards have been shown to be the most effective means to combat high fertility.

In terms of the Palestinian economy, some major macro-economic changes will be necessary and potentially beneficial. Development of new industrial estates should be implemented while rehabilitating both sea and airports in the Gaza Strip. In addition, establishing secure independent borders and trade routes with Israel and between the Gaza Strip and the West Bank will be vital for economic viability. Changes in trade relations must also be made, including some level of government protection and subsidies for Palestinian producers, which can be lifted as economic conditions improve.

In order for the OPT's economy to develop, a number of smaller scale strategies might be adopted. In addition to changes to international trade relations, the Palestinian population must also be encouraged and educated to buy Palestinian products. A system of labeling may be developed to facilitate this. To reduce environmental pressures, attempts should be made to steer the OPT's economy away from heavy pollution industries, while developing stronger environmental industry standards.

The development of sustainable agriculture may be another means, by which economic viability and sustainability might be addressed. In the case of land degradation, awareness campaigns might be launched, informing farmers of various methods to reduce soil erosion and to minimize chemical contamination on their properties. High priority should be given to conduct a comprehensive assessment of agricultural lands suitable for irrigation, and to develop contingency plans for the short- and long-term potential expansion in irrigated areas.

Strategies, regarding water and agriculture, must remain adaptive to changing social and economic conditions, as well as overall water availability. Other forms of sustainable agriculture may involve the development of roof top gardens and urban agriculture. The increasing urbanization of the OPT could make this a viable alternative strategy, in order to increase food security and address poverty. Opening up new areas for grazing will have particular benefit for the problems of overgrazing and desertification in the OPT. However, due consideration must again be mad for the preservation of the OPT's open spaces and the intrinsic value of natural habitats.

A major challenge to sustainable development in the OPT will be to increase the distribution of water resources to both individuals and industry, while maintaining services affordable. Primarily, the Palestinian people must obtain their full rights in all of their water resources (including surface and groundwater resources). After that, attention may be given to develop non-traditional water supplies, such as treated wastewater, brackish water, and water harvesting, including construction of small dams and reservoirs for harvesting water during the rainy season. Construction of conveyance networks will also be vital to disseminate water-harvesting practices.

In terms of biodiversity, immediate actions must be taken to identify and monitor endangered species and ecosystems. High priority to expanding and protecting forested areas should also be given. Adequate staff training in nature conservation and management should receive high priority. The situation in the OPT is fundamentally hindered by the chronic lack of space. Identifying and protecting key ecosystems, while limiting urban expansion, will be vital to prevent the further loss of natural habitats in the OPT.

14.5 Outlook

The status of the environment in the Occupied Palestinian Territory is in a critical state. Immediate actions must be taken to address many of the environmental issues that threaten the OPT's capacity for sustainable development.

As a country with a state in transition, sustainable development is vital in the OPT, and is becoming increasingly urgent, as a result of the Israeli unilateral plan of disengagement. The extent to which the OPT can be both viable and sustainable will be dependent on the OPT's geographical and geopolitical continuities, economic and political conditions, as well as access to natural resources.

Sustainability will also be dependent upon the path of development and the need to avoid narrow interpretations of progress, based solely on economic circumstances. This will necessitate a radical shift in our perception of sustainability and the theory of sustainable development into a more comprehensive and future-orientated conception of human well-being.

The OPT receives some of the largest levels of foreign aid, that has enabled significant development possibilities. However, the ongoing Occupation and its inhumane practices, such as closures and otherwise, have prohibited any significant progress being made, particularly in terms of economic development highlighting the centrality of the Israeli Occupation, regarding the capacity for sustainable development in the OPT.

While donor support and sustainability projects are still important, in terms of the peace process and alleviating humanitarian issues, more effort by Palestinians and the international community must be made to pressure Israel into an immediate withdrawal from the OPT and cessation of its policies of colonization and exploitation.

If Occupation continues, the outcome will be not encouraging at all, and the Palestinian natural resources and environment will be badly depleted and degraded. The Occupation in its current uninhibited state is eliminating the very foundations of a viable and sustainable Palestinian State, and subsequently precluding the prospects of a lasting peace in the Middle East.

Strategies for sustainable development in the OPT too often ignore the centrality of the Israeli Occupation. Due to its pivotal role, it is recommended that the issue be brought back to the forefront of debate and political action among international actors.

Annexes

Annex1: Summary of Major Indicators for Sustainable Development in OPT		
Land Use and Geopolitical profile		
West Bank (WB)	Palestinian control	39% of the total WB area 5661 km^2
	Area «C»	23.7% of the total WB area (Under Israeli control falls between western Segregation Wall and eastern Segregation Zone)
	Israeli control	37.3 % of the total WB area (Include western Segregation Zone and eastern Segregation Zone)
Gaza (G)	Palestinian control	83 % of the 362 km^2 of Gaza area (Including areas surrendered to Palestinians following the Israeli withdrawal in September 2005, including Rafah international crossing with limited Palestinian control)
	Israeli control	17 % of the 362 Km^2 of Gaza area (Buffer zone area along the eastern and northern borders of Gaza, including 6 crossing/ terminal points)
Improving Social Conditions and Human Development		
POPULATION	Population growth	The annual growth rate reaching 3.3% in the OPT (3.0% in the West Bank and 3.8% in the Gaza Strip).
WOMEN **Promoting women status in society**	Women per 100 men in the labor force	Participation rate among male was 67.6% and 14.5% among female.
	Ratio of average female wage to male wage	Female = 72.2 NIS Male = 85.3 NIS Female/Male = 84.6 NIS for female / 100 NIS for male
	Difference between male and female school enrollment ratio	89.0% (87.6% for males and 90.3% for females)
	Female Literacy Rate	97.1% for male and 89.8% for female

EDUCATION **Developing education facilities in a manner to increase education Accessibility**	School Enrollment Ratio (primary and secondary)	Primary: 91.2% for total, 90.5% for male and 92.1% for female Secondary: 74.5% total, 69.8% for male, and 79.5% for female.
	Number of schools and Kindergartens	Schools = 2,277 Kindergartens = 935
	Student/Teacher Ratio in UNRWA and other Schools	UNRWA = 29.6 students / teacher Government = 21.3 students / teacher Private = 14.1 students / teacher
	Class density figures (Average number of students per class)	Government = 35.5 students / class UNRWA = 39.3 students / class Private = 23.2 students / class
HEALTH **Maintaining a healthy society by providing adequate health services to all urban, rural and refugee communities.**	Total Fertility Rate	4.2 WB 5.4 G.
	Infant Mortality Rate	20.8 per 1,000 live births
	Life Expectancy at Birth	71.7 years for males and 73.2 years for females
Ensuring clean accessibility to water and sewage systems in all sectors.	Sewage systems	Only 56 of Palestinian localities are connected to the Sewage network

Freshwater		
Ensuring effective use of water resources	Annual recharge quantities.	Abstraction from Groundwater = 56.3 MCM, WB Abstraction from Groundwater = 150 MCM, G Rainfall 3407 MCM, WB Rainfall 106 MCM, G Groundwater recharge= 970 MCM, WB Groundwater recharge = 42 MCM G Surface runoff = 155 MCM. WB Surface runoff = 64 MCM. WB Quantities of water used annually exceed 120% of the annual recharge quantities.
	Israeli Control	82 % of the Palestinian water from the West Bank's Aquifer is utilized by Israel
	Water Consumption	OPT = 83 m^3/yr Israel =277 m^3/yr Israel
	Gaza Costal Aquifer	Concentration of chloride ranges 500 mg/L in the upper layers < 10,000 mg/L with the increasing depth.
Protecting the quality of water resources	Quality of Water Resources	70-80% of the untreated domestic wastewater produced in Gaza discharged into the Mediterranean Sea. In the West Bank 93 % is discharged untreated into the Environment. Only 30% of solid waste are processed by landfilling

Biodiversity		
The sound use and conservation of nature and biodiversity	Forest and Nature Reserve	Total forest area forms 1.42% of total West Bank area (ARIJ GIS, 2006). Palestinian Access to Forested areas 0.28 % Total nature reserves area forms 12.8% in the West Bank and Gaza Strip (ARIJ GIS, 2006). Palestinian Access to nature reserves 1.6% Total afforested areas forms 4.1% in West Bank and Gaza Strip Deforestration: 59% since 1970 (MOA, 1999) Uprooted Trees by Israel: 794162 trees since 10 years. No Conservation programs
	Extinct, endangered, and vulnerable species and Ecological communities	Rare species: 303 species (14.7% of total species) Very Rare species: 67 species (3.23% of total species) Endemic Species: 102 species (4.9% of total species). Endangered Endemic Species: 47.1% Low frequent species, 11.8% Rare species, 5% Very Rare species
	Aquatic habitat destruction	Over-fishing: 33.8% rare fish of total fish species in Gaza 8.5% are very rare fish of total fish species in Gaza

Waste		
Moving away from disposal of waste towards waste minimization, reuse, recycling and recovery	Generation of Waste	Municipal solid waste=1728 ton daily WB and 1116 ton daily Gaza Industrial waste OPT = 54,800 tons Medical Waste: Health care OPT = 426.1 tons Monthly Secondary health care OPT = 120.8 tons Monthly Hazardous solid waste hospitals OPT = 784 tons yearly
	Collection rate	90.3% of households served
	Minimization of waste production	There are no solid waste composting Only 1% of the solid wastes is recycled, 30% of the solid waste is dumped in sanitary landfills.
	Destination of household wastes	161 dumping sites in the West Bank and 3 in the Gaza Strip
	Wastewater	Only 55.3 % of the wastewater generated in the OPT collected by sewage network

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