

# Environmental Profile for the West Bank

Volume 6

*Jerusalem District*



*Applied Research Institute-Jerusalem*

*P.O.Box 860*

*Caritas Street, Bethlehem*



*June 1996*

# Environmental Profile for The West Bank Volume 6 Jerusalem District

*Applied Research Institute - Jerusalem  
October 1996*

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<b>Project Team</b>	
<b>Dr. Jad Isaac</b>	Project Leader
<b>Violet N.Qumsieh</b>	Project Coordinator
<b>This Volume's Coordinator and Main Editor</b> Leonardo Hosh	
<b>Contributors to this volume</b>	
<b>Leonardo Hosh</b>	M.Sc. in International Agricultural Development - Aquaculture
<b>Nader Sh. Hrimat</b>	M.Sc. in Plant Production
<b>Maher Owewi</b>	M.Sc. in Remote Sensing - GIS Specialist
<b>Walid Sabbah</b>	M.Sc. in Hydrogeology
<b>Sawsan Istanbouli</b>	Diploma Biological Sciences
<b>Nizar Qattoush</b>	B.Sc. in Biological Sciences
<b>Akram Haliekeh</b>	B.Sc. Geology
<b>Dima Hodaly</b>	B.Sc. in Chemistry
<b>Abed Al-Hakim A'mer</b>	B.Sc. Environmental Engineering
<b>Thaer Abu Diab</b>	M.Sc. Chemical Engineering
<b>Roubina Basous</b>	B.Sc. Biological Sciences
<b>Supportive Staff</b>	
<b>Issa Zboun</b>	GIS Technician
<b>Nadia Dajani</b>	B.Sc. Biological Sciences
<b>Helena Murad</b>	B.Sc. Librarian
<b>Isam Ishaq</b>	M.Sc. Communications
<b>Rafat Ishaq</b>	B.Sc. Mathematics and Computer Specialist
<b>Foad Isaac</b>	GIS Technician
<b>Jamil Shalalkeh</b>	GIS Technician
<b>Ibrahim Swaiti</b>	GIS Technician
<b>Safinaz Bader</b>	B.Sc. Soil Sciences and Irrigation
<b>Shadi Hanouneh</b>	GIS Technician
<b>Hanna Maoh</b>	B.Sc. in Physics and Mathematics
<b>Rana Ishaq</b>	Secretary
<b>Nisreen Mansour</b>	Secretary

# Acknowledgment

*The Applied Research Institute - Jerusalem (ARIJ) would like to thank the Federal Government of Austria, Department of Development Cooperation for their funding of this project through the Society for Austro-Arab Relations (SAAR).*

*ARIJ specially thanks Mr. Khalil Tafakgi, director of the Map center of the Arab Studies Society in Jerusalem, and the Palestinian Central Bureau of Statistics (PCBS) for their cooperation and providing valuable information and essential data.*

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**Maps demonstrated in this publication were produced by the [Geographic Information Systems \(GIS\) Unit](#) at the Applied Research Institute - Jerusalem.**

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## Introduction

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This Profile is prepared and published by the Applied Research Institute - Jerusalem (ARIJ) as one in a series of reports on the status of the environment in the West Bank. It is a major component of a two-year project financed by the Federal Government of Austria, Department for Development Cooperation, through the Society of Austro-Arab Relations in Jerusalem (SAAR) to establish an Environmental Information System for the West Bank and Gaza Strip.

Environmental Profiles are necessary for assessing the environmental soundness and sustainability of the existing and planned local and regional development projects. These are of special importance especially in the context of the new and rapid development brought by the current peace negotiations.

Despite its historical, religious, and political importance, no work has yet been done to address the environmental status of the Jerusalem District. Jerusalem City, the heart of the district and its mostly populated area, has become overcrowded, exerting a pressure on its natural resources. The religious, economic, and cultural significance of Jerusalem attracts millions of visitors every year to the city. An efficient infrastructure is accordingly needed to provide services for these visitors while preserving Jerusalem's environment, and archaeological and religious significance. This Profile, therefore, specifically addresses issues related to the major components of the environment in the Jerusalem District, providing data which are helpful for the planners and policy-makers in implementing rehabilitation projects to relief environmentally stressed areas and to prevent future deterioration.

The Jerusalem District Profile emphasizes the primary environment safety component such as air quality, climate, water resources, soil, land use, agriculture, noise, solid waste and waste water. In addition to pollution sources, the socio-economic aspects of the problems are addressed. The Profile also includes a section on the historical and archaeological sites in the district. As the extension of the flora and fauna in the Jerusalem District is unrestricted to the political boundaries of the district, they will be addressed collectively with those of the other districts in the Comprehensive Environmental Profile for the whole West Bank. This comprehensive profile is scheduled to be out by the end of 1996.

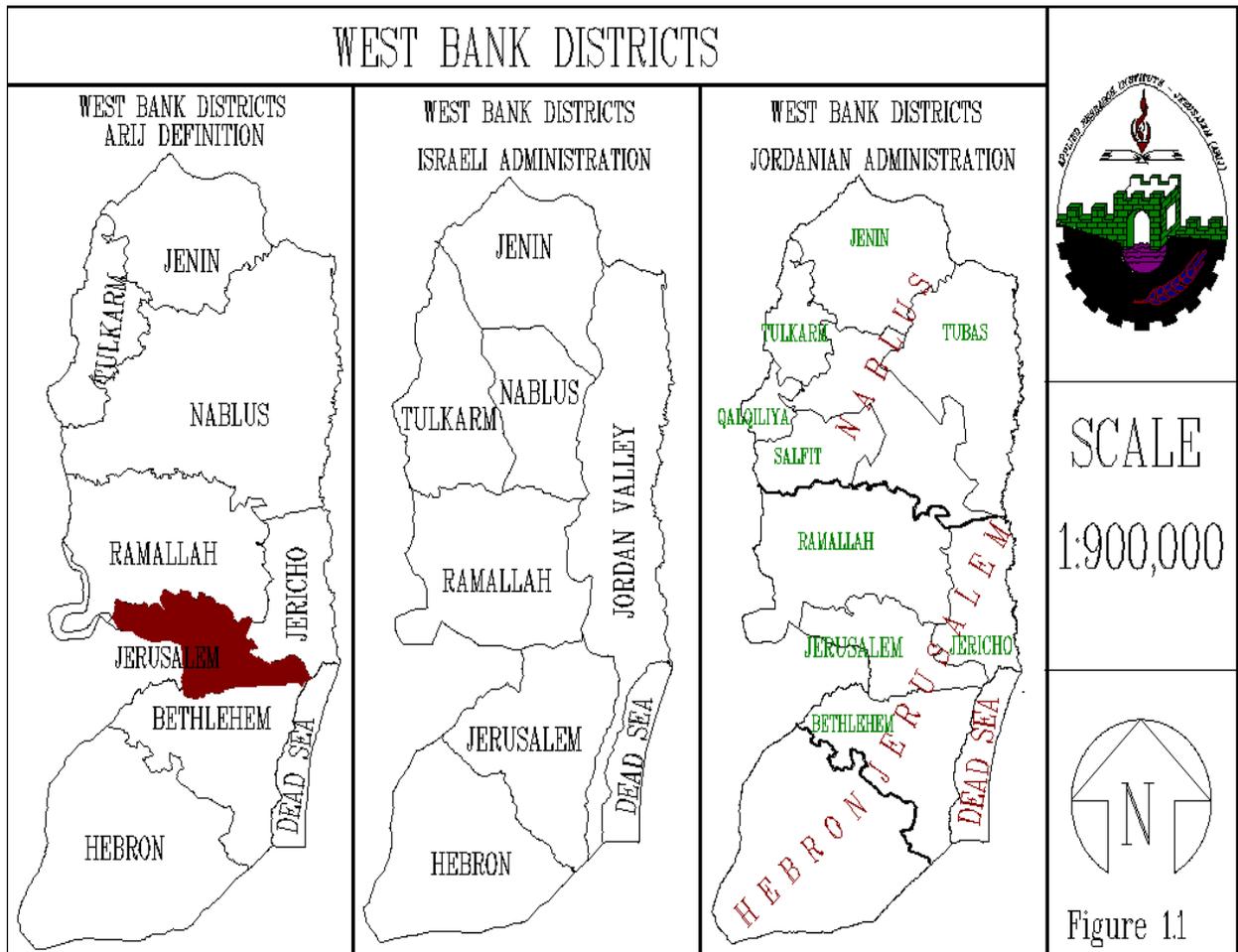
A major portion of the information and data used in this report is based on primary field research, questionnaires, investigations, and personal interviews conducted by the project team. Maps and information related to geographical land areas have been prepared by the Geographic Information System (GIS) Unit team at ARIJ.

ARIJ specially thanks Mr. Khalil Tafakgi, director of the Map center of the Arab Studies Society in Jerusalem, and the Palestinian Central Bureau of Statistics (PCBS) for their cooperation and providing valuable information and essential data.

## Chapter One Jerusalem - The Basics

### Jerusalem District Geopolitical Boundaries

According to the Jordanian administrative classification, Jerusalem Governate was comprised of the districts of Bethlehem, Jerusalem, Jericho, and Ramallah. Later, the Israeli government, after its occupation of the West Bank in 1967, re-classified the West Bank administrative districts and excluded Jerusalem from its map (Figure 1.1). For the purpose of this profile, and to expose the Jerusalem City and its vicinity areas, ARIJ adopted the Jordanian-defined Jerusalem Sub-district as the geographical boundaries of the Jerusalem District (Figure 1.1).



The differences in the definition of the Jerusalem District created an obstacle for data collection. For instance, information obtained from the PCBS, which has a similar



Sharqiya, Bab Al-Zahira, Beit Hanina, Kafr A'qab, Old City, Ras Al 'Amoud, Shua'fat, Shua'fat Refugee Camp, Silwan, Sur Bahir, Um Tuba, and Wadi Al-Joz. Also located in this area are the Israeli settlements of Neve Ya'acov, Pisgat Ze'ev and Pisgat O'mer, Giva'at Ishapera, Ma'alot Dafna, Giva'at Hameftar, Giva'at Hamatos, Ramot, French Hill, East Talpiyot, Rekhes Shua'afat, A'tarot Industrial Zone, and Ramat Eshkol. Note that the localities of Beit Safafa and Gilo Settlement, and the Airport are formally excluded, although they are part of current boundaries of the East Jerusalem Municipality, as they lay in the Jordanian-defined Bethlehem and Ramallah District respectively. However, because of their integration with the remaining localities of East Jerusalem, these areas will be included in various sections of the profile.

2. The Remaining Parts of the Jerusalem District, which include the Palestinian localities of Abu Dies, Mukhmas, El-E'izariya, A'nata, Hizma, Jaba', Er-Ram, Qalandiya Refugee Camp, Beir Nabala, Nabi Samuwil, Judeira, Rafat, El-Jieb, Beit Iksa, Beit Surik, Biddu, Beit Ijza, Beit Duqqu, El-Qubeiba, Beit A'nan, and Qatanna. Also located in this area are the Israeli settlements of Ma'ale Adumim, Qedar, Site, Giv'at Binyamin, Mishor Adumim, Kefar Adumim, Allon, A'lmon, Kalia, Kokhav Ya'acov, Giva'at Haradar, Mirekez Qelito, Ramot Allon, Giv'on Hadasha, and Giva'at Ze'ev.

It is worth mentioning here that according to the Oslo II interim agreement between the Israelis and the Palestinians, dated September 1995, most Palestinian villages in the [Figure 1.1](#) West Bank Districts [Figure 1.2](#): Palestinian built-up areas Jerusalem District, excluding those inside the East Jerusalem municipal boundaries, were assigned as 'Area B'. In 'Area B', the provision of civil services is under the responsibility of the Palestinian Authority, while Israel retains control over security issues. Areas surrounding Palestinian built-up zones were designated as 'Area C', where Israel retains full control over security and land resources. East Jerusalem is also under the Israeli control, through the Israeli Jerusalem Municipality ([Figure 1.3](#)). According to the Oslo II agreements, this classification and fragmentation of the Jerusalem District may change as negotiations continue. It is expected that several areas designated as 'Area B' will be re-designated as 'Area A', and several 'Area C' lands will be re-designated as 'Area B' or 'Area A'. However, the permanent shape of the geopolitical map of the Jerusalem District will be drawn after an agreement is reached on the final status of the Palestine/Israel conflict. These final-Status negotiations were officially started on 5 May 1996.



were the first to build the fortress Zion in the town of Jerusalem. Zion is a Canaanite word which means "hill" or "height" ([Asali, 1989](#)). Soon after the occupation of Jerusalem by King David in approximately 1000 BC, this fortress, which occupied a small part of the whole city of Jerusalem, was called David's City ([Keter, 1973](#)). With the passage of time, both names of Zion and David's City were commonly used to refer to the entire city of Jerusalem.

As for its population, Jerusalem during the first three thousand years of its history belonged entirely to the Canaanites. According to book of Judges, Chapter 19, no Jews were living in the city during that period, as it says:

*"In those days when there was no king in Israel, a certain Levite set out on a journey to seek his concubine.... He had with him his servant. When they were near Jebus [i.e. Jerusalem] the day was far and the servant said to his master: "Come now let us turn to this city of the Jebusites and spend the night in it." [And his master said to him], "We will not turn aside to the city of foreigners who do not belong to the people of Israel."*

Following the first Israelite occupation of Jerusalem in 1000 BC, the indigenous Jebusite inhabitants remained in the city. *"But the people of Benjamin did not drive the Jebusites who dwelt in Jerusalem, so the Jebusites have dwelt with the people of Benjamin in Jerusalem to this day"* (Judges 1:21). *"To this day"* refers to the time when this Old Testament chapter was written, approximately fifth century BC.

Across history, Jerusalem has been occupied by many outsiders including Egyptians, Assyrians, Babylonians, Persians, Greeks, Romans, Byzantines, Crusaders, Turks, British and Israelis. Table 1.1 lists the chronology of Jerusalem through history. However, from the early Canaanites period through the latest ones, archaeology indicates that transitions of cultures and peoples of Jerusalem were gradual. John Worrel wrote "The standard picture of serial invasions replacing one culture [in Jerusalem] with another is not only far too simplistic -- it is basically wrong." ([Worrel, 1995](#)). The indigenous inhabitants of Jerusalem stayed in the city throughout the centuries, plowing their fields and trading goods.

For only as little as 78 years, just little over 1% of those six thousand years, did Jerusalem serve as the recognized capital of a unified nation --biblical Israel. Other nations including Romans, Persians, Arabs, and Turks took hold of Jerusalem, each dominating extended periods as long as 430 years. Through history, however, archaeological findings indicate that Jerusalem has always been an inter-ethnic city.

Presently, the indigenous inhabitants of the city -- the Palestinians, encounter a new threat of displacement by Israel in order to unilaterally declare Jerusalem exclusively Israeli. The State of Israel, soon after its occupation of the Palestinian East Jerusalem began implementing plans to displace the city's Palestinian inhabitants with Israeli Jews. The efforts and measures which has been practiced by the Israeli government and the

subsequent closure of the city have not only affected the religious freedom but also brought severe adverse environmental and economic effects on the city and its indigenous people, the Palestinians.

## Present Day Jerusalem

Among all cities in historic Palestine, Jerusalem city possesses a special political, economic, and religious status for people around the world, especially for Christians, Muslims, and Jews. Soon after its occupation of Palestinian East Jerusalem in 1967, the Israeli government enforced several measures which changed the geopolitical boundaries of the city, and its legal and physical status, in an effort to facilitate the Israeli subsequent illegal annexation of Jerusalem.

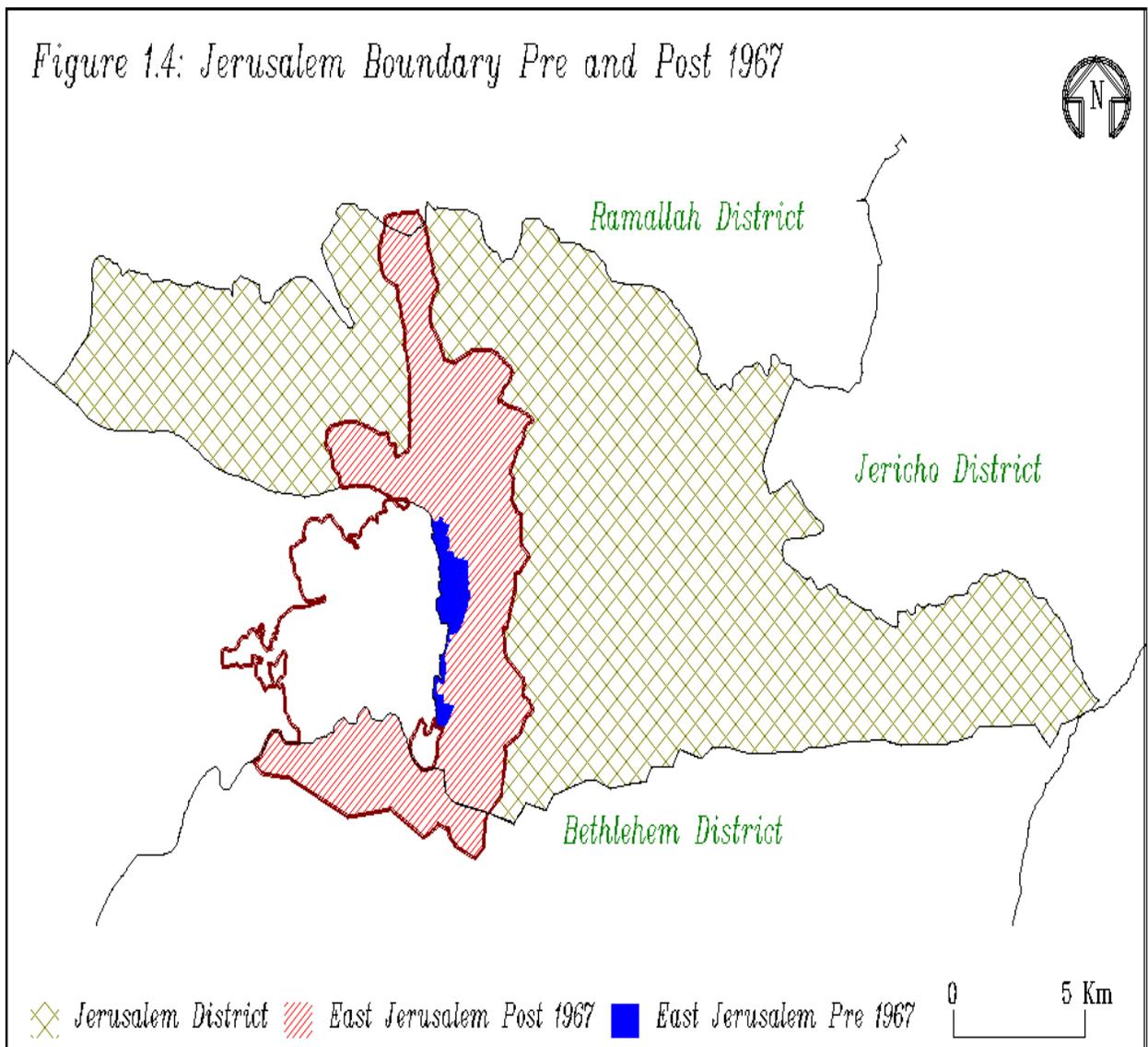
The first measure was the application of the Israeli law and administration on the city of Jerusalem. Following this, Israel unilaterally expanded the municipal boundaries of the city in a jagged manner, enabling it to include as much land as possible while excluding as

**Table 1.1: Major Events in Jerusalem Through History**

Historical Event	Period	Duration (Years)
Oldest records of Jerusalem	4000 BC	
Canaanite Rule	4000 - 1000 BC	3000
King David Conquer and Rule over Jerusalem	1000 - 961 BC	39
King Solomon Rule	961- 922 BC	39
Israel divided into Israel and Judea	922 - 586 BC	336
Babylonians Conquest	586 - 537 BC	50
Persian conquest	537 - 332 BC	205
Greek conquest	332 - 141 BC	191
Maccabean Rule	141 - 63 BC	78
Roman Conquest	63 BC - 323 AD	386

Bar Kokhba Revolution	132 - 135 AD	3
Byzantine Conquest (Christian Era)	323 - 614 AD	291
Persian Conquest	614 - 628 AD	14
Byzantine Re-Conquest of Jerusalem	628 - 638 AD	10
Arab Conquest (Islamic Era)	638 - 1072 AD	434
Turkish Conquest	1072 - 1092 AD	20
Arab Second Conquest of Jerusalem	1092 - 1099 AD	7
Crusaders first conquest of Jerusalem and the Establishment of the Latin Kingdom of Jerusalem	1099 - 1187 AD	88
Arab Conquest	1187 - 1229 AD	42
Crusader Second Conquest by Frederick II	1229 - 1244 AD	15
Arab Conquest of Jerusalem by the Khwarezmyians from Egypt	1244 - 1517 AD	273
Turkish Conquest by the Ottomans	1517 - 1831 AD	314
Egyptian Rule and Conquest by Mohammed Ali	1831 - 1841 AD	10
Turkish Re-Conquest	1841 - 1917 AD	76
British Occupation	1917 - 1922 AD	5
British Mandate	1922 - 1948 AD	26
Israeli Occupation of West Jerusalem, and Arab Occupation of East Jerusalem and the Old City	1948 - 1967 AD	19
Israeli Conquest of East Jerusalem	1967 - present	28
Sources: <a href="#">PASSIA 1992</a> , <a href="#">Yousef, 1982</a> ; <a href="#">Dumper 1993</a>		

much of the Palestinian population as possible ([Kuttab, 1995](#)). The boundaries of the East Jerusalem were enlarged from 6.5 km<sup>2</sup> to 70.5 km<sup>2</sup>, which enveloped land from 28 Palestinian villages and towns in the West Bank ([Tafakgi, 1995](#)) ([Figure 1.4](#)). Even with this expansion to 10.8 times its original size, only 22,000 Palestinian inhabitants were added to the population of East Jerusalem ([Kothari & Abu Shakrah, 1995](#)). Lands from Beit Hanina, A'nata, Abu Dies, and five other villages, for example, were absorbed into the new extended East Jerusalem but their populations of approximately 80,000 people were excluded (PALGRIC, 1992; [Kothari and Abu Shakrah, 1995](#)). To enable this expansion, 16.33 and 0.68 Km<sup>2</sup> of land were included from the Bethlehem and Ramallah District respectively. The Palestinian inhabitants of the city were given blue identification cards (ID) which distinguished them from Palestinian inhabitants living in the rest of the West Bank, who are obliged to carry orange ID's.



**Figure 1.4: Jerusalem boundary pre and Post 1967**

In 30 July 1980, the Israeli Knesset passed a law declaring East Jerusalem part of united Jerusalem, the capital of Israel and officially annexed the city to the State of Israel ([Kuttab, 1995](#)). Regardless of the many international and United Nations resolutions condemning this annexation, particularly 298, Israel continued with its policies and, moreover, proceeded to Judaize the city. Many Palestinian lands within the new municipal boundaries were confiscated, closed or assigned for 'public use'. 'Public use' traditionally implies building housing neighborhoods for exclusively Israeli Jews. Presently, only 13.5% of Palestinian East Jerusalem is available for Palestinians to live on or develop. The remaining land is left under the Israeli control ([Kaminker, 1995](#)).

As of today, not a single new Palestinian neighborhood has been planned in East Jerusalem while more than 15 large-size Jewish neighborhoods have been built in East Jerusalem and several more are planned ([Kaminker, 1995](#); [Tafakgi, 1995](#)). Such policies changed the population demography of the city from just a few hundreds Jews in 1967 to over than 160,000 at the present ([PASSIA, 1996](#)). This number is almost close to the number of Palestinians now living in the Palestinian East Jerusalem.

Furthermore, to ensure maximum control over the land, the Israeli government designed a bizarre urban planning scheme for East Jerusalem in which approximately 86.5% of the land became out of Palestinian reach. According to this scheme, few building permits were granted to Palestinians and, when given, these have great restrictions on the construction size and the number of floors. In sum, the development of Palestinian neighborhoods has been stunted and the provision of municipal services is extremely neglected. Such circumstances have led to several serious environmental problems in East Jerusalem, including accumulation of solid wastes, overcrowding, land degradation, unhealthy housing and living conditions, among others. These problems are further discussed in the next chapters of this book.

Despite the rich heritage, and the religious and economic attachment to the city, and strong family ties, Palestinians residing in the West Bank and the Gaza Strip are presently denied by the Israeli government free access to the Palestinian East Jerusalem. Since January 1991, Palestinians are required to obtain special permits from Israel in order to enter the city, whether for worship, visiting relatives, seeking medical treatment, or searching for a source of income. On many occasions, permits are suspended and entry to Jerusalem is indiscriminately denied to all Palestinians.

Also, historically, the economic base of Jerusalem is found in its role as a market center for the rest of the geographic Palestine and other neighboring regions. The closure of East Jerusalem to Palestinians living in the remaining parts of the West Bank and Gaza Strip has therefore greatly affected the trade routes and devastated the city's economy, as well as the economy of the West Bank and Gaza Strip. This has been followed by a noticeable retreat in the social interactions and the economic living standards.

The final status negotiations on Jerusalem have officially started on 3 May 1996, and are scheduled to last for a maximum of three years. Aspects of Jerusalem to be discussed include: sovereignty over the city, the legal structure, religious freedom, and cultural

rights. However, in the meantime, the Israeli government has not stopped its unilateral practices in Jerusalem in which it is creating *de facto* realities on the ground, including building settlements, confiscating land, opening roads, and expanding the Jerusalem boundaries. These *de facto* realities will affect the outcomes of the negotiations on the final status of Jerusalem, to favor Israel. Such action is totally in violation to all United Nations resolutions, particularly 298 ([Appendix I](#)) and 242, and all standing Palestinian-Israeli agreements.

The recent Israeli elections of 1996 have moreover brought a government with extremely conservative positions towards the exclusivity of Jerusalem for Israel. Further changes to the physical status of East Jerusalem are therefore expected, including new Israeli settlements and alteration of borders. However, In all scenarios, East Jerusalem is and will continue to be physically, socially, and religiously an undetachable and integral part of Palestine.

## Chapter Two Demography And Socio-Economy

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### Demography

No census has been recently carried out which surveys all areas in the Jerusalem District. The last census was done immediately after the Israeli occupation of the West Bank and Gaza Strip in 1967, in which the population figures for the Jerusalem area were representative of those people living inside the 1967 extended Jerusalem municipal boundaries. Earlier census was carried out by the British Mandate government in 1922, and 1931 (Anglo-American Committee of Inquiry, 1946). After the establishment of the Palestinian Authority, the Palestinian Central Bureau of Statistics (PCBS) began preparing for a comprehensive survey of the Palestinian population in Palestine. This project is scheduled to start soon ([Al-Ayam Newspaper, 7 February 1996](#)). The currently available population numbers for Jerusalem District are therefore rough estimations, with a substantial percentage of error. The following table (Table 2.1) shows the population in each of the Palestinian towns and villages outside the East Jerusalem municipal boundaries, based on data published by the PCBS:

Locality	Population	Locality	Population
Abu Dies	7,332	Mukhmas	1,474
El-Eizariya	10,491	'Anata	3,173
Hizma	3,290	Jaba'	1,528
Er-Ram	2,046	Qalandia Refugee Camp*	7,156
Beir Nabala	1,745	Nabi Samuwil	171
Judeira and Qalandia	3,454	Rafat	1,111
El-Jieb	2,660	Beit Ikxa	1,196
Beit Surik	2,257	Biddu	3,586
Beit Ijza	404	Beit Duqqu	1,090
El-Qubeiba	1,636	Beit A'nan	2,845
Qatanna	4,132	<b>TOTAL</b>	<b>62,777</b>
Source:	PCBS,		1994
* : Source UNRWA, 1996			

However, this total is lower than an estimate more recently released by PCBS. The total number of the Jerusalem District, including East Jerusalem, was estimated by PCBS at 254,387 ([Al-Ayam Newspaper, 7 May 1996](#)). As the East Jerusalem population is estimated to be 165,808 (see below), then the remaining parts of the Jerusalem District house approximately 88,579 people.

Most of the Palestinian population outside the East Jerusalem Municipal boundaries is concentrated in the western parts of the district. Few Palestinian communities exist in the eastern parts of the district as a major portion of this area is declared as a closed military area or nature reserve ([Chapter Six](#)).

The number of Israeli settlers residing in the Jerusalem District in the area outside the East Jerusalem municipal boundaries is estimated at 32,850 individuals (approximately 9,125 families). These are distributed over 14 settlements ([Arab Studies Society, Maps Center, 1995](#)).

Regarding the East Jerusalem area, the 1967 census conducted by the State of Israel indicated that 66,000 Palestinians resided in East Jerusalem, of whom 44,000 lived in the area known before the June 1967 war as East Jerusalem and 22,000 in the West Bank areas annexed after the war. Non-Palestinians living in East Jerusalem at that time were a few hundred, mostly old communities of Palestinian Jews.

A study published in 1993 showed that between 1967 and 1993, at least 50,000 Palestinian Jerusalemites have emigrated or been forced out to live in areas outside the municipal boundaries of East Jerusalem. This figure is divided as follows ([Kothari & Abu Shakrah, 1995](#)):

- 16,917 have emigrated abroad;
- 12,080 were forced to move outside the borders of municipal East Jerusalem because of the lack of housing;
- 12,500 currently live in the northern Jerusalem area outside the municipal boundaries (therefore are subject to loss of benefits);
- 7,630 were outside the country or outside the Jerusalem municipal boundaries in 1967 and were never issued Jerusalem identity cards, and therefore do not have the right to return.
- Several other thousands lost identity cards by living outside East Jerusalem for six years or more and have no right to return.

This massive emigration was a result of several policies imposed by the Israeli government which made it difficult or impossible for many Palestinians to build new houses, keep their houses, or maintain their residency as East Jerusalemites.

According to the Israeli statistics of June 1993, the number of Palestinians living in East Jerusalem was only 150,000 while the number of officially registered Israeli settlers has grown into 155,000 ([Kothari & Abu Shakrah, 1995](#)). The increase in the Palestinian population of East Jerusalem is largely due to natural growth. The average annual natural

growth rate of Palestinian Jerusalemites for the years 1978 to 1994 reached 3.01% ([Municipality of Jerusalem, et al., 1996](#)). Population numbers for the year 1994 were recently released by PASSIA, based on a US government report dated July 1995, and estimates the Palestinian population of East Jerusalem at 156,268 (including Beit Safafa with 4,742 people) and the Israeli settlers at 161,806 (including the Gilo settlement with 30,000 settlers) ([PASSIA, 1996](#)). The geographical distribution of the Palestinian communities and the Israeli settler populations are outlined in Tables 2.2 and 2.3.

The number of Israeli settlers in East Jerusalem, though is expected to increase in a rapid rate as more Israeli settlements are being built, has been recently reported by the Jerusalem Institute of Israel Studies as declining due to low rate of natural growth and internal emigration ([Al-Quds Newspaper, 20 June 1996](#)). According to the released report, the percentage of Israeli settlers in East Jerusalem presently reaches 48.9% of the population (approximately 156,000 individuals) while the remaining 51.1% are Palestinians.

**Table 2.2: Projected Palestinian Population in East Jerusalem**

Neighborhood	1994	1995 <sup>1</sup>	1996 <sup>1</sup>
El-Tur (Mt. Of Olives)	14,124	14,549	14,987
Abu Tor	2,240	2,307	2,377
Bab Az-Zahira	4,227	4,354	4,485
Beit Hanina	17,423	17,947	18,488
Beit Safafa	4,742	4,885	5,032
I'sawiya	4,843	4,989	5,139
Kafr A'qab	5,360	5,521	5,688
Ras Al 'Amoud	9,869	10,166	10,472
Shiekh Jarah	2,474	2,548	2,625
Shua'fat <sup>2</sup>	19,072	19,646	20,237
Silwan	6,598	6,797	7,001
Sur Bahir and vicinity	23,431	24,136	24,863
Wadi Al-Joz	6,186	6,372	6,564
Wadi Hilwah	2,474	2,548	2,625
Old City	26,701	27,505	28,333
Other	6,495	6,690	6,892
<b>TOTAL</b>	<b>156,286</b>	160,960	165,808

Source: PASSIA, 1996.<sup>1</sup> The population numbers for the years 1995 and 1996 were based on an annual increase of 3.01% for every year.

<sup>2</sup> Including Shua'fat refugee camp.

On the contrary, as a measure to limit Palestinian growth in the city, few Jerusalemites have been given family re-unification papers for family members (including spouses, children, parents, and siblings) from outside East Jerusalem. If a Jerusalemite woman wish to marry to man holding a West Bank ID, she should move to live outside East Jerusalem. However, according to Israeli law, which is discriminately applied only to Palestinians, Israel could cancel the ID of every Palestinian Jerusalemite who is residing in areas outside East Jerusalem.

Approximately 93.4% of the Palestinian inhabitants of East Jerusalem are Muslims (154,898) and the remaining 6.6 % are Christians (10,910) ([Sabella, 1995](#)).

**Table 2.3: Israeli Settler Population in East Jerusalem**

Settlement	Population	Settlement	Population
East Talpiot	18,000	Old City	2,300
French Hill	8,300	Pisgat Ze'ev	30,100
Gilo	30,000	Ramat Eshkol	6,300
Ma'alot Daphnia	4,606	Ramote	37,900
Mt. Scoops	5,000		
Neve Ya'acov	19,300	<b>TOTAL</b>	161,806

*Source: Arab Studies Society, Map Center, 1995.*

## Socio-Economy

In respect to social and economical status, the populations of the Jerusalem District who live outside the East Jerusalem municipal boundaries are mostly rural. Although they live in farming communities, their agricultural activities are limited. Most of their income comes from working as hired laborers inside Israel or in the West Bank.

In East Jerusalem, the population is divided into five main distinctive categories:

- The Old City:** There are approximately 28,333 Palestinian people (approximately 17.1% of the East Jerusalem population) residing within the walls of the Old City. They live in highly dense neighborhoods, reaching up to 473 individuals per hectare in the Islamic quarter (20,700 people living in 43.8 hectares) and 260 individuals per hectare in the Christian Quarter (4,700 people living in 18 hectares) ([Municipality of Jerusalem et al., 1996](#)). The 2,300 Jews residing in the Old City of Jerusalem live in lower density, averaging 177 people per hectare. They also enjoy socio-economic standards and municipal services preferred than those provided for the Palestinians in the Old City ([PASSIA, 1996](#); [Municipality of Jerusalem et al.,](#)

[1996](#)). The Palestinian people of this category are mainly elderly, of more than 65 years of age. Moreover, the Jerusalem office of social welfare reported in 1992 that cases of physical disabilities, drug addictions, unemployment, and psychological problems are numerous among this category ([Arab Studies Society, Map Center, 1995](#)). A book recently released by the Society of Austro-Arab Relations in Jerusalem gives greater and very detailed report on the socioeconomic status in the Old city ([SAAR, 1996](#))<sup>1</sup>.

- **East and North of the Old City:** This includes inhabitants of the areas such as Sheikh Jarrah, Beit Hanina, and others. The number of educated individuals within this category is relatively high. They mostly work in trade and have their own private businesses. Housing conditions are relatively adequate in these areas, except in the Shua'fat refugee camp.
- **South of the Old City:** This includes people living in the areas such as Silwan, Al-Thouri, Sur Bahir and others. The families of this category are large in size with many children. They generally have low incomes and live in degraded and closely built houses, especially in Silwan and Al-Thouri areas ([Photo 2.1](#)). Palestinian communities further south, such as Sur Bahir, are less crowded and their houses are more dispersed. This category depends primarily on the Israeli labor market for its income.



[Photo 2.1: Silwan village, showing crowded and ill-serviced housing units, 1996.](#)

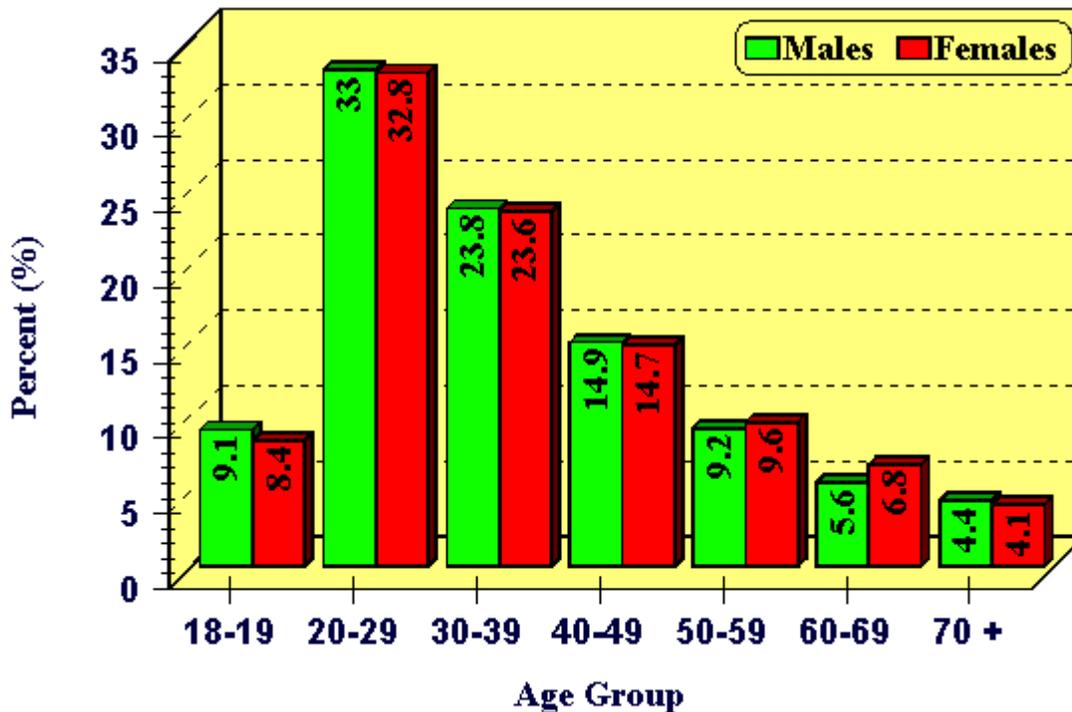
- **Refugee Camps:** This includes the 14,913 inhabitants of the refugee camps of Qalandia and Shua'fat who were expelled from their land during the 1948 war ([UNRWA, 1996](#)). Most of these are owners of properties and land which are currently inside Israel proper. People under this category, who have been refugees for the last 48 years, are still denied the right to return to their land. They live under very degraded living conditions, in houses with a few small rooms, and many family members. They receive minimum services from the Jerusalem municipality. Services to these two camps are primarily provided by the United Nations Relief and Work Agency (UNRWA). The issue of Palestinian refugees will be on the agenda of the final status negotiations between Palestine and Israel. A special committee within the ongoing multilateral peace negotiations has also been formed to discuss a settlement for the refugees' problem.

A large percentage of the working force in the refugee camps is skilled laborers in construction. The new generation of refugees is better educated than their parents, who have lost the chance to learn due to the harsh political circumstances through which they endured.

- **Israeli Settlements:** includes over than 156,000 Israeli settlers who inhabit 10 major settlements scattered over East Jerusalem. The family size of this category is relatively small, averaging 3.6 individuals per family. Their housing units are well serviced and many of their homes can be classified as luxurious.

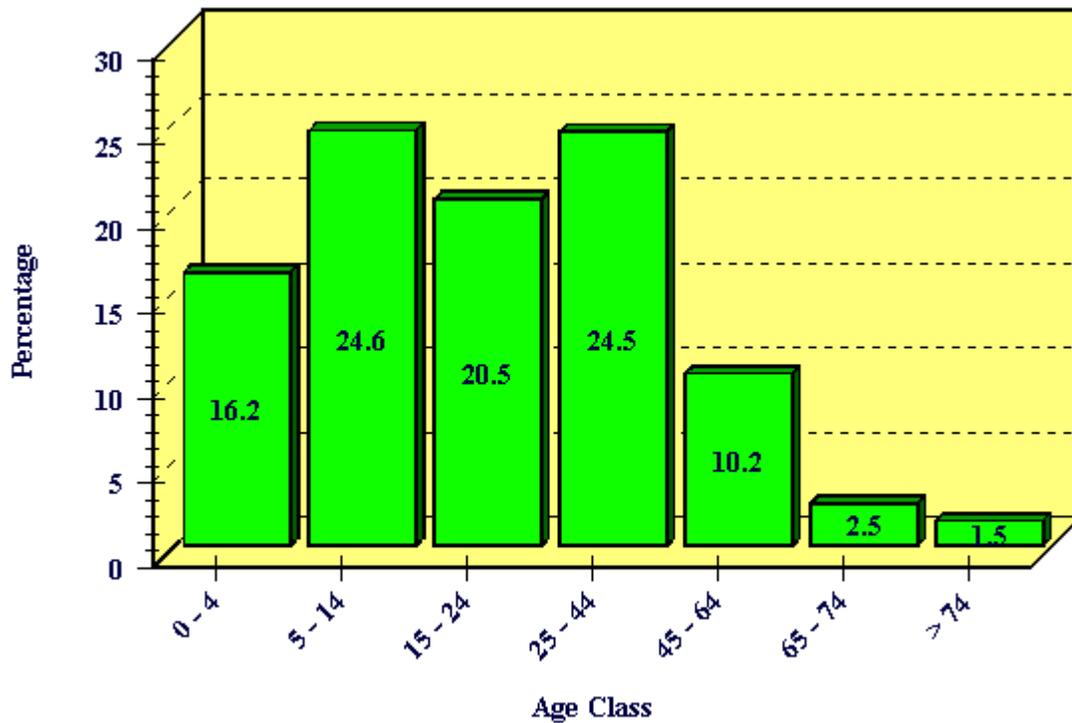
## Age Structure

Information about the population structure in the Jerusalem District, can be concluded from the recently held Palestinian election campaign which took place in January 1996. The total number of people in the Jerusalem District who registered for the elections (above 18 years of age) was 76,400. Out of these, 50.12% were females and the remaining 49.88% were males (PCBS Files) ([Figure 2.1](#)). Also, field surveys of more than 15,000 families in the West Bank, excluding East Jerusalem, showed that approximately 46.9% of the population are below 15 years of age ([Al-Ayam, 7 February, 1996](#)). This percentage is more or less inclusive of the characteristic of the Palestinian communities in the West Bank, including Jerusalem.



**Figure 2.1: Distribution of the Palestinian population in the Jerusalem District by age and gender.**

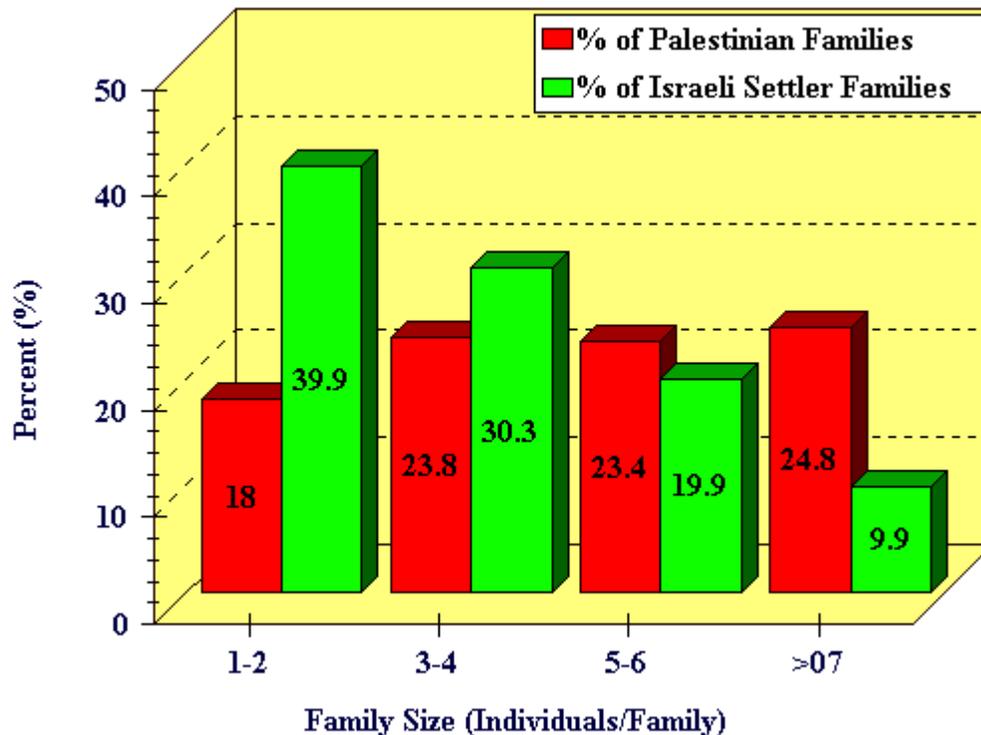
In East Jerusalem, the population is characterized by a large percentage of youth. Approximately 16.2% of the Palestinian population of East Jerusalem are between zero and 4 years of age ([Municipality of Jerusalem, et al., 1996](#)) and 36% are from 5 to 19 ([Arab studies Society, Map Center, 1995](#)). Thus nearly 52.2% of the population is 19 years old and below ([Figure 2.2](#)). This 52.2% of the society is very unlikely to earn income and achieve financial independence. The ratio of the Palestinian working age (20 - 64) to the non-working age (0 - 19 and > 65) is low, reaching 0.78, compared to 0.99 among the Israeli settlers community ([Arab Study Society, Maps Center, 1995](#)). Such a young society, therefore, requires supportive social services and infrastructure (schools, day-care, ...etc.). Such services are currently insufficient in the Palestinian neighborhoods of East Jerusalem.



*Figure 2.2: Distribution of the population in the East Jerusalem by age class.*

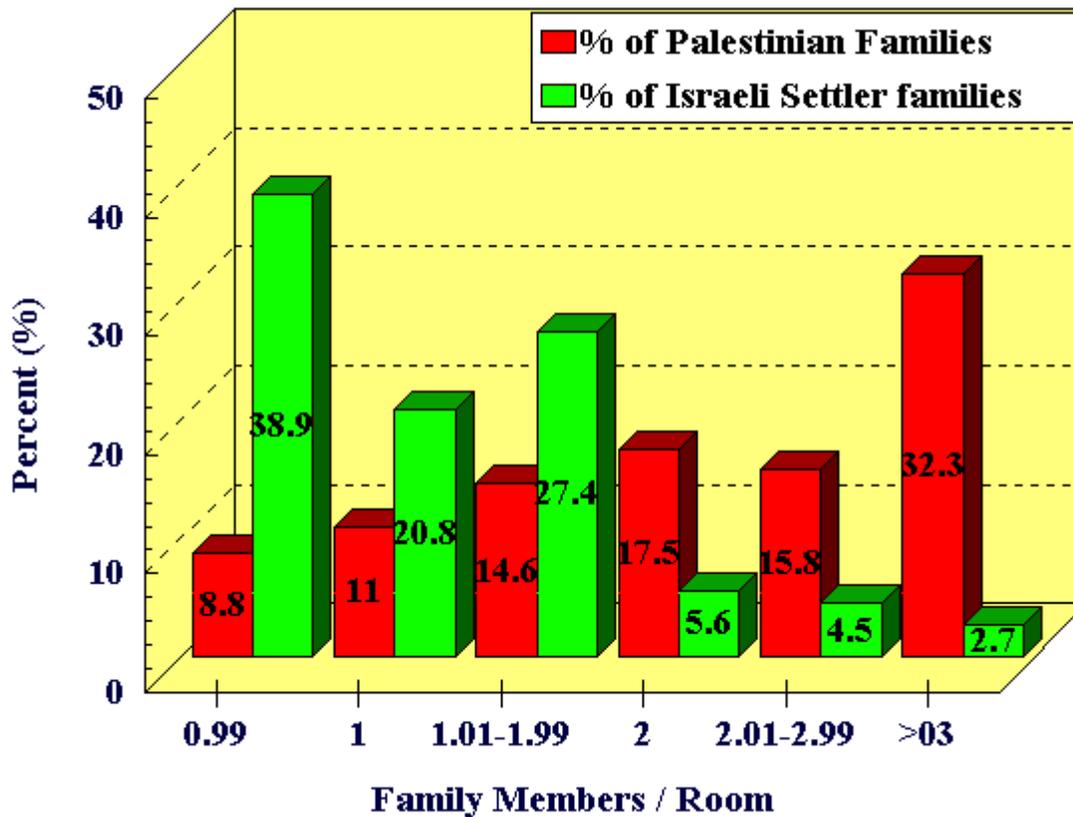
### **Family and House Size**

The average size of a Palestinian family in East Jerusalem is 5.4 persons while it is 3.6 among the Israeli settlers for the years 1983 - 1993 ([Municipality of Jerusalem et al., 1995](#)). Approximately one fourth of Palestinian families consists of more than 7 individuals, and half of them consist of more than 5 ([Figure 2.3](#)).



**[Figure 2.3: Family size in East Jerusalem by population groups.](#)**

The number of individuals per room among Palestinians in East Jerusalem averages 2.2, whereas it is 1.1 among Israeli settlers ([Municipality of Jerusalem et al., 1995](#); [Archives of the Arab Study Society - Maps Center, 1995](#)). Only 10% of the Palestinian families live with a density of less than one individual per room while 38.9% of the Israeli settlers live with this low density ([Archives of the Arab Study Society - Maps Center, 1995](#)). On the other hand, more than 30% of the Palestinian families live with a density of more than 3 individuals per room and only 3% of the Israeli settler families do the same ([Archives of the Arab Study Society - Maps Center, 1995](#)). [Figure 2.4](#) shows the distribution of families according to number of individuals per room. These figures indicate the urgent need for housing and development projects for the Palestinian inhabitants of East Jerusalem. They also show the impact of years of an inequitable housing distribution policy imposed by the Israeli Government to limit the growth of Palestinian Jerusalemites and increase Jewish settlers in the City ([Chapter 6](#)).

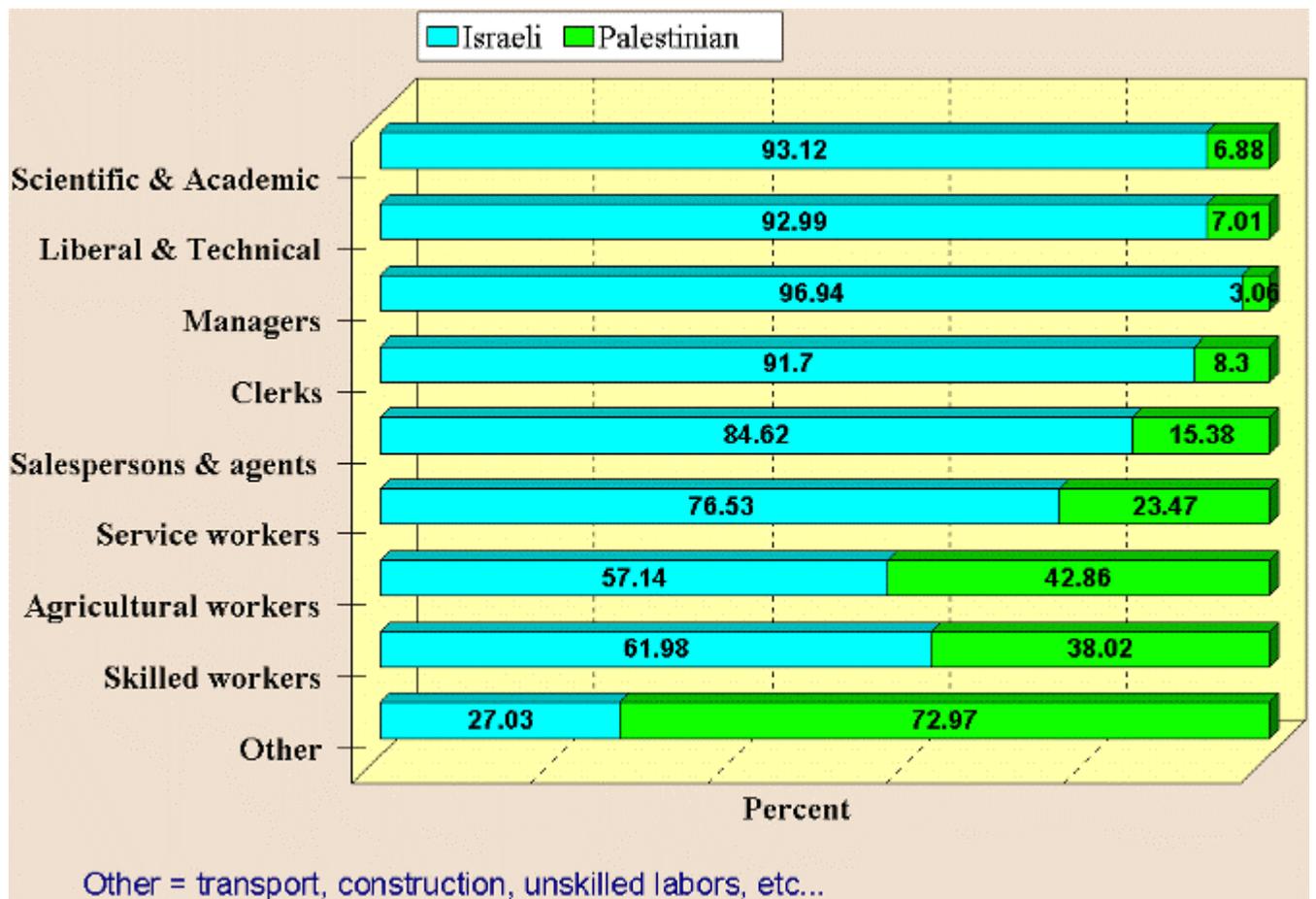


*Figure 2.4: Family members per room in East Jerusalem by population groups.*

### Labor Force

According to the Israeli Central Bureau of Statistics for the year 1993, approximately 32,700 Palestinian East Jerusalemites are involved in the civilian labor force. Of those, 29,500 are men and 3,200 are women ([Municipality of Jerusalem et al., 1995](#)).

The distribution of the labor force between the various professions ([Figure 2.5](#)) shows that most Palestinian laborers occupy low-paying jobs. In contrast, the majority of the Jews of West Jerusalem work in jobs that are higher paying. This contrast has led to a substantial difference in income and in the living standards.



**Figure 2.5: Distribution of labor in East Jerusalem by population groups.**

<sup>1</sup> Society for Austro-Arab Relations (SAAR)  
 Jerusalem Office: P.O.Box 31840, Jerusalem, Tel. 972-2-819553, Fax. 972-2-823757  
 Vienna Office: Zollergasse 30, A-1070 Vienna, Austria, Tel ++431-526-7810, Fax. ++431-526-7795

## **Chapter Three Infrastructure And Services**

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The provision for infrastructure and civil services in the East Jerusalem area is currently the responsibility of the Jerusalem Municipality. However, the deliberate procrastination of the Jerusalem municipality in approving town planning schemes for most Palestinian areas in East Jerusalem had hindered any serious development of the infrastructure and services since 1967. Without planning schemes it has been impossible to open new roads, lay sewerage networks, extend pipeline systems, designate building areas for new schools or public institutions, or develop public parks and gardens. The inadequate road network has consequently led to traffic jams, low quality services in trash collection, mail distribution, and even fire station services. The lack of planning schemes has also led to the freezing of building permits in most parts of the Palestinian neighborhoods, leading to overcrowding.

The denial of building permits and consequent overcrowding have left few options available. As a result, unlicensed housing construction in Palestinian East Jerusalem continues to be built. Unlicensed houses are built with no proper planning or services and are always threatened to be demolished by the Israeli Jerusalem municipality. Such an extended freeze in services and building permits has led to a state of frustration among Palestinian Jerusalemites as they see the Israeli settler neighborhoods increasingly growing and developing on lands belonging to Palestinians and with the financial and administrative support of the Israeli Jerusalem Municipality and the Ministry of Housing.

In areas outside East Jerusalem, infrastructure and services are provided by either the Palestinian local village councils. Both, however, lack enough funding and capabilities to develop these areas. Local councils, therefore could barely provide basic services to these communities.

The following pages assess the status of infrastructure and civil services in the Jerusalem District and addresses their impact on the environment.

### **Education**

The educational system in the Jerusalem District is currently controlled by two main bodies: The Palestinian Ministry of Education in areas outside the municipal boundaries of East Jerusalem, and the Israeli office of education of the Jerusalem municipality in East Jerusalem schools and educational institutions.

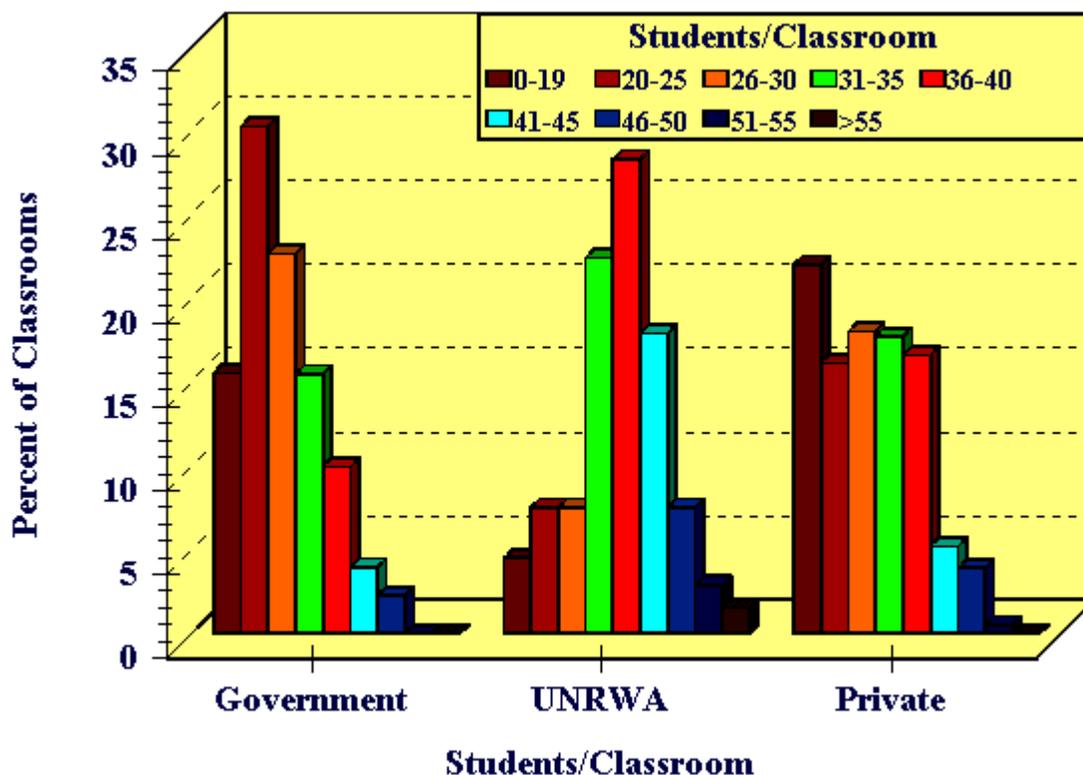
Three types of schools generally exist in the district: governmental, UNRWA, and private. These greatly differ in their quality of education and the adequacy of facilities. Private schools range between church owned, Waqf owned, or privately owned.

In the areas outside East Jerusalem, 78 schools provide services for almost 20,000 Palestinian students ([PCBS et al., 1995](#)). The majority of these schools are private (Table 3.1).

	SCHOOL TYPE			TOTAL
	Government	UNRWA	Private	
<b>School Number</b>	16	7	55	78
<b>Those rented</b>	9	3	19	31
<b>Those owned</b>	6	4	28	38
<b>Have electric supply</b>	0	7	53	60
<b>Have regular water supply</b>	1	2	4	7
<b>Male Students</b>	1,437	1,205	6,645	9,287
<b>Female Students</b>	3,484	1,219	5,753	1,0456
<b>Total Students</b>	4,921	2,424	12,398	19,743
<b>Number of Classrooms</b>	189	60	440	689
<b>Average Students/room</b>	26.03	40.40	28.18	31.54

*Source: PCBS et al., 1995.*

The number of students per classroom is highest in UNRWA schools compared to both governmental and private schools ([Figure 3.1](#)).



*Figure 3.1: Number of students per classroom in the Jerusalem District (excluding East Jerusalem).*

There is an apparent need to improve the educational system in the Jerusalem District in respect to buildings, school and lab facilities and educational curriculum. The new Palestinian Ministry of Education has in fact begun designing a comprehensive plan to develop the educational system in the West Bank and the parts of the Jerusalem District which fall under its jurisdiction.

In East Jerusalem, the education system serves approximately 44,000 Palestinian students (Arab Studies Society, Map Center, 1995) and hires 1,476 teachers ([Al-Quds Newspaper, April 1996](#)). Out of these, 21,000 (47.7%) are enrolled in the 35 existing public (municipal) schools, and 20,000 students are enrolled in 34 non-municipal educational institutes. The remaining 3,000 Jerusalemite students currently attend schools located outside the municipal boundaries of East Jerusalem ([Arab Studies Society, Map Center, 1995](#)). The non-municipal schools are owned and run by either Christian churches, Islamic Waqf, or UNRWA. The distribution of Palestinian students in East Jerusalem according to the educational stage is listed in Table 3.2.

**Table 3.2: Distribution of Palestinian Students by Educational Stage**

<b>Educational Stage</b>	<b>% of Student number</b>
<b>Pre-School</b>	<b>7.6</b>
<b>Elementary</b>	<b>55.9</b>
<b>Preparatory</b>	<b>21.6</b>
<b>Secondary</b>	<b>14.2</b>
<b>Special Education</b>	<b>0.7</b>
<b>TOTAL</b>	<b>100</b>

In addition, East Jerusalem contains four colleges of the Al-Quds (Jerusalem) University, namely Medical Professions, Law, Science and Technology, and Islamic Religion (Osol Eddin).

**Table 3.3: Shortage in Classrooms in the Various East Jerusalem Neighborhoods**

<b>Neighborhood</b>	<b>Shortage in Classrooms</b>
<b>Isawiya</b>	18
<b>Sliwan and vicinity</b>	43
<b>Abu Tur and vicinity</b>	13
<b>Sheikh Jarah and Wadi El-Joz</b>	63
<b>Old City</b>	40
<b>Beit Hanina and Shua'fat</b>	64
<b>Beit Safafa</b>	26
<b>Sur Bahir and Um Tuba</b>	13
<b>Mt. Mukaber and Sawahreh</b>	28
<b>Thouri</b>	37
<b>TOTAL</b>	345

The increasing youth population in East Jerusalem has exerted pressure on the existing educational institutions. Even though approximately 53% of the Palestinian students of East Jerusalem attend private schools, the municipal schools are still inadequate and classrooms are crowded, averaging 30 children per classroom ([Arab Studies Society, Map Center, 1995](#)). Moreover, with the lack of approved planning schemes for many

Palestinian localities of East Jerusalem, the Jerusalem Municipality denied Palestinians building permits for additional private and public schools. As a consequence, a recent study conducted by the Jerusalem Municipality, Department of Strategic Planning, found that 345 new classrooms are needed to satisfy the current needs of the Palestinian population of East Jerusalem ([Arab Studies Society, Maps Center, 1995](#)). The Jerusalem Municipality, currently not meeting the present needs of the Palestinian population, promised to build 325 new classrooms within the coming three years. The localities suffering from shortage in classrooms are listed in Table 3.3.

In addition, a large number of the existing municipal classrooms are rented in inadequate facilities and locations. This has led to several serious incidents, including the collapsing of a school wall and the fall of two-ton rock from a cliff onto a kindergarten serving 45 children ([Kothari & Abu Shakrah, 1995](#)).

According to municipal resources, currently there are at least 391 classrooms that are inadequate for use ([Arab Studies Society, Maps Center, 1995](#)). The education system in East Jerusalem suffers from reduced numbers of both teachers and administrators and a very degraded budget.

Furthermore, the recent tightening of the closure of East Jerusalem by Israel, began in early March 1996, has since prevented 617 teachers from the West Bank and Gaza Strip from reaching their job locations in East Jerusalem. Thus, Israel is depriving the Palestinian educational system and students in East Jerusalem of around 40% of their staff (total number of teachers in East Jerusalem is approximately 1,476), as well as preventing 7,000 West Bank students from attending their classes in East Jerusalem ([Al-Quds Newspaper, April 1996](#)).

## **Health Services**

The health services in the Jerusalem District are well-developed relative to other districts in the West Bank. The district houses seven major hospitals, of which three are general, three are maternity and one is ophthalmic. In addition, over than 37 medical facilities exist in the district, including primary health care clinics, disabilities and drug rehabilitation centers, and Old-aged houses ([Appendix I](#)).

The medical facilities in the Jerusalem District are mainly located in the East Jerusalem area. Field survey, conducted by ARIJ team in early 1996, showed that approximately 150,000 patients every year refer to East Jerusalem hospitals for treatment. A major portion of these patients is from areas outside East Jerusalem or from other districts in the West Bank. The well-equipped and highly specialized medical care facilities in East Jerusalem are in many cases the sole provider of medical treatment for thousands of West Bank and East Jerusalem patients. Thus, the health system of East Jerusalem is an integral and indispensable part of the overall West Bank health system. The Israeli closure of East Jerusalem to Palestinians from other areas is therefore depriving thousands of patients from receiving the appropriate treatment.

The provision of health services for Palestinians in Jerusalem has been greatly affected by the Israeli closure and, in particular, during the frequent tightening of the closure of East Jerusalem, as in the case of the recent closure which started in early March 1996. On several occasions, and for extended periods, Israel has prevented doctors and medical staff who are residents of areas outside East Jerusalem from reaching their job locations in East Jerusalem. In a letter sent to the Israeli Prime Minister, Mr. Shimon Peres, dated March 27, 1996, the directors of five major hospitals in East Jerusalem explained that the East Jerusalem hospital's activity dropped by 75% after the closure and that approximately two third of the medical staff come from the West Bank and Gaza Strip and have been unable to get to the hospitals. Al-Maqased hospital, for example, was greatly devastated by the closure as 400 out of its 640 employees were denied access to their jobs. Augusta Victoria hospital also was deprived of 70% of its staff ([Al-Manar Newspaper, 22 April 1996](#)). Consequently, measures should be taken to improve the accessibility of staff and patients to the health facilities in East Jerusalem in a manner that would not be affected by the political environment.

A summary profile of East Jerusalem health facilities is outlined in [Table 3.4](#).

<b>Hospital</b>	<b>Specialization</b>	<b>No. of Beds</b>	<b>No. of Physicians</b>	<b>No. of Nurses</b>	<b>Annual number of Patient*</b>
Al-Maqased	General	264	114	306	85,647
Augusta Victoria	General	141	37	139	NA
St. John	Ophthalmic	82	12	63	50,000
St. Joseph	General	73	5	44	NA
Red Crescent	Maternity/Obstetric	27	13	27	1,560
Dajani	Maternity	12	2	10	2,000
Al - Quds - Qalandia	Maternity	23	4	8	3,600
<b>TOTAL</b>		<b>622</b>	<b>187</b>	<b>597</b>	<b>142,807</b>
<i>Source: <a href="#">PRC, 1994</a></i> <i>* = Numbers obtained from personal interviews with hospital officials.</i> <i>NA = Information not available.</i>					

The number of physicians, nurses and paramedics in the Jerusalem District relative to the population number is considerably higher than in other West Bank districts. However, such numbers may lead to misconceptions as thousands of people from outside the district are treated annually in the Jerusalem District medical facilities.

## **Streets and Roads**

The presence of roads is a precondition for extending services to communities in the Jerusalem District, as well elsewhere. This includes laying sewerage, drainage, and drinking water networks, collecting trash, and putting in street lights. Unlike the Israeli settlements in the Jerusalem District, most Palestinian houses in East Jerusalem are built away from main roads and streets. In many Palestinian neighborhoods, houses are built in dispersed locations which make it difficult and expensive to connect each of them to a road or sewerage network. Consequently many of these neighborhoods lack most of the above mentioned services. A more detailed description of roads in the Jerusalem District is found in Chapter 6.

The East Jerusalem street network is lighted by only 2,700 street lights (compared to approximately 9,300 used in West Jerusalem). Also, 80% of the light bulbs are designed to light only local areas and sidestreets rather than main roads ([Arab Studies Society, Maps Center, 1995](#)).

There is an urgent need to develop road systems in East Jerusalem Palestinian neighborhoods, that at least match the standards applied to streets in the Israeli settlements of East Jerusalem.

## **Fire Station Services**

Most of the Palestinian villages and towns in the Jerusalem District lack their own fire fighting and emergency facilities. These towns depend on facilities in the neighboring main cities of Bethlehem, Jericho, Ramallah, and sometimes East Jerusalem. There are no clear figures on the number of Palestinian towns and villages that have their own fire fighting and emergency facilities.

A single fire station exists in East Jerusalem, located east of the Old City. This station is responsible for fire fighting, investigation of fire incidents, prevention of fire, and extension for all areas in East Jerusalem, including its northern parts. The station hires 12 employees who are distributed on three shifts ([The Arab Studies Society, Maps Center, 1995](#)).

The location and setup of the fire station in East Jerusalem are not adequate. The station is located on a steeply sloping street and opposite to the vegetable market. These conditions do not facilitate the quick exit of the fire truck in times of emergency. Direct communication between the fire station, staff dorms, and offices does not exist. Moving the fire station into a better location is essential, plus an additional station is also needed to cover the northern parts of the city.

Fire fighting within the walls of Old City is another serious problem. In this overcrowded part of Jerusalem, the narrow streets and stairs do not permit free movement of fire trucks to all parts of the Old City. There is an inadequate number of street water outlets to supply water for fire hoses in all parts of the Old City and this put its inhabitants at a serious risk. More water outlets are needed in the Old City and the purchase of special compact fire vehicles suitable for this area is also essential.

### **Postal Services**

No information was gathered on the total number of post offices in the Jerusalem District. However, research showed that there are 14 post offices in the East Jerusalem area. Only 3 of these offices are located in and serve Palestinian neighborhoods, namely those in Beit Hanina, Shua'fat, and Salah Eddin Street. Ten post offices are located in the Israeli settlements of East Jerusalem. These are located in Neve Ya'acov (1), Pisgat Ze'ev (1), Ramat Allon (1), East Talpiyot (2), Mount Scopus (1), Gilo (3), the Jewish Quarter (1). The remaining post office is located near Jaffa Gate inside the Old City walls and serves both the Palestinian and Israeli populations (MAP, 1996; Field work, 1996).

There is a need for additional post offices in the Palestinian neighborhoods of East Jerusalem where currently the average load on each post office is estimated at 45,428 people. Moreover, the two postal offices of Beit Hanina and Shua'fat do not provide all postal services offered in other areas so people of these neighborhoods are obliged to travel to the main post office at downtown Jerusalem (Salah Eddin St.) to satisfy their needs.

### **Tourism**

East Jerusalem is a center of attraction to millions of tourists and pilgrims who visit the city from all over the world. In 1993, East Jerusalem hosted approximately 862,000 guests, of which 660,000 were tourists ([Arab Studies Society, Maps Center, 1995](#)). However, East Jerusalem is not developed enough in terms of infrastructure and services to accommodate such large numbers of tourists. The 30 hotels currently existing in East Jerusalem are quite small in size and number of rooms, all together providing 1,871 rooms ([Arab Studies Society, Map Center, 1995](#)). In contrast, the 31 hotels in the Israeli West part of Jerusalem have a total of 5,520 rooms ([Jerusalem Municipality, et al., 1996](#)). Therefore, theoretically, if tourists were equally distributed between East and West Jerusalem, Palestinians hotels in East Jerusalem could only accommodate 34% of the total number of tourists.

There is certainly a need to develop the tourism sector in East Jerusalem and provide the infrastructure needed to support its development. This is essential when taking into consideration that East Jerusalem hotels occupy almost 85% of the tourism industry in whole Palestine.

Areas outside the East Jerusalem also include many important archaeological and historic sites ([Chapter 11](#)). Few of the sites are, however, well qualified to receive visitors and

tourists. The only area in the Jerusalem District, outside East Jerusalem, that has hotels is Al-Ezariya and Abu Dies. There is a need to maintain the archeological and historic sites in the Jerusalem District and to develop the tourist sector.

In sum, the Jerusalem Municipality fails to provide the Palestinian communities in East Jerusalem with adequate services, or services matching those provided for Israeli settlements. Despite their contribution of over 20% to the budget of the Israeli Jerusalem Municipality, the Palestinian inhabitants of East Jerusalem receive only 5% of the municipal services ([Hoffman, 1995](#)). That is, according to Hoffman, Palestinians of East Jerusalem receive 5 to 10 US cents to every dollar they pay for the municipality. This low budget has been reflected in the quality of services, including education, waste collection, sewage disposal, drainage systems, street maintenance, drinking water networks, housing projects, and many others. In contrast, the Israeli settlers of East Jerusalem enjoy 5-year municipal tax exemption and receive full services from the municipality.

Table 3.5 shows a summary of the several services provided for Palestinian towns in the Jerusalem District, excluding East Jerusalem.

<b>Town/Village</b>	<b>Adminis- tration</b>	<b>Medical Clinics</b>	<b>Elect. Sinc..</b>	<b>Piped Water %</b>	<b>No. of Schools</b>	<b>Transport.</b>	<b>Roads</b>
<b>Abu Dies</b>	Village Council	2	1967	100	3	P&B	Paved
<b>Al-Jeib</b>	Mukhtar	1	1982	100	2	P&B	Paved
<b>Al-Qubeibeh</b>	Mukhtar	2	1978	100	1	P&B	Paved
<b>A'nata</b>	Mukhtar	3	1965	100	2	P&B	Paved
<b>Beir Nabala</b>	VC	1	1961	100	4	P&B	Paved
<b>Beit A'nan</b>	VC	1	1975	100	2	P&B	Paved
<b>Beit Duqqu</b>	Mukhtar	1	1976	100	2	P	Paved
<b>Beit Ijza</b>	Mukhtar	0	1979	100	2	P	Bad
<b>Beit Iksa</b>	VC	2	1980	75	2	P&B	Paved
<b>Beit Surik</b>	Mukhtar	--	--	100	2	P&B	Paved
<b>Biddu</b>	Mukhtar	7	1976	100	2	P&B	Bad
<b>El E'izariya</b>	VC	2	1960	100	7	P&B	Paved
<b>Er- Ram</b>	VC	--	--	100	2	--	--
<b>Hizma</b>	Mukhtar	3	1981	100	2	P&B	Paved

<b>Jaba'</b>	Mukhtar	1	1973	100	2	P&B	Bad
<b>Judeira</b>	Mukhtar	0	1977	100	1	P&B	Paved
<b>Mukhmas</b>	Mukhtar	1	1980	100	2	P	Paved
<b>Qatanna</b>	Mukhtar	2	1983	100	1	P&B	Bad
<b>Rafat</b>	Mukhtar	1	1978	100	1	P&B	Paved

*P = Private B = Public VC = Village Council*

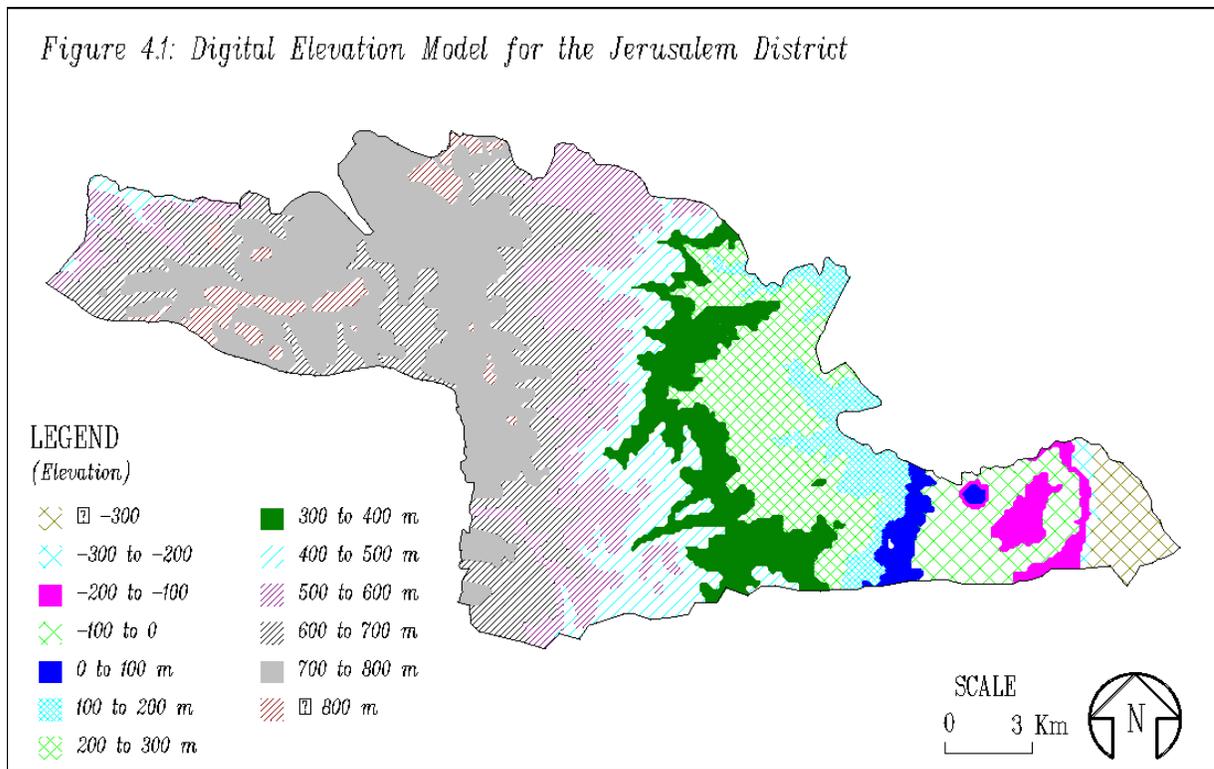
Source: [\*European Palestinian Chamber of Commerce, 1993\*](#)

## Chapter Four Topography and Climate

### Topography

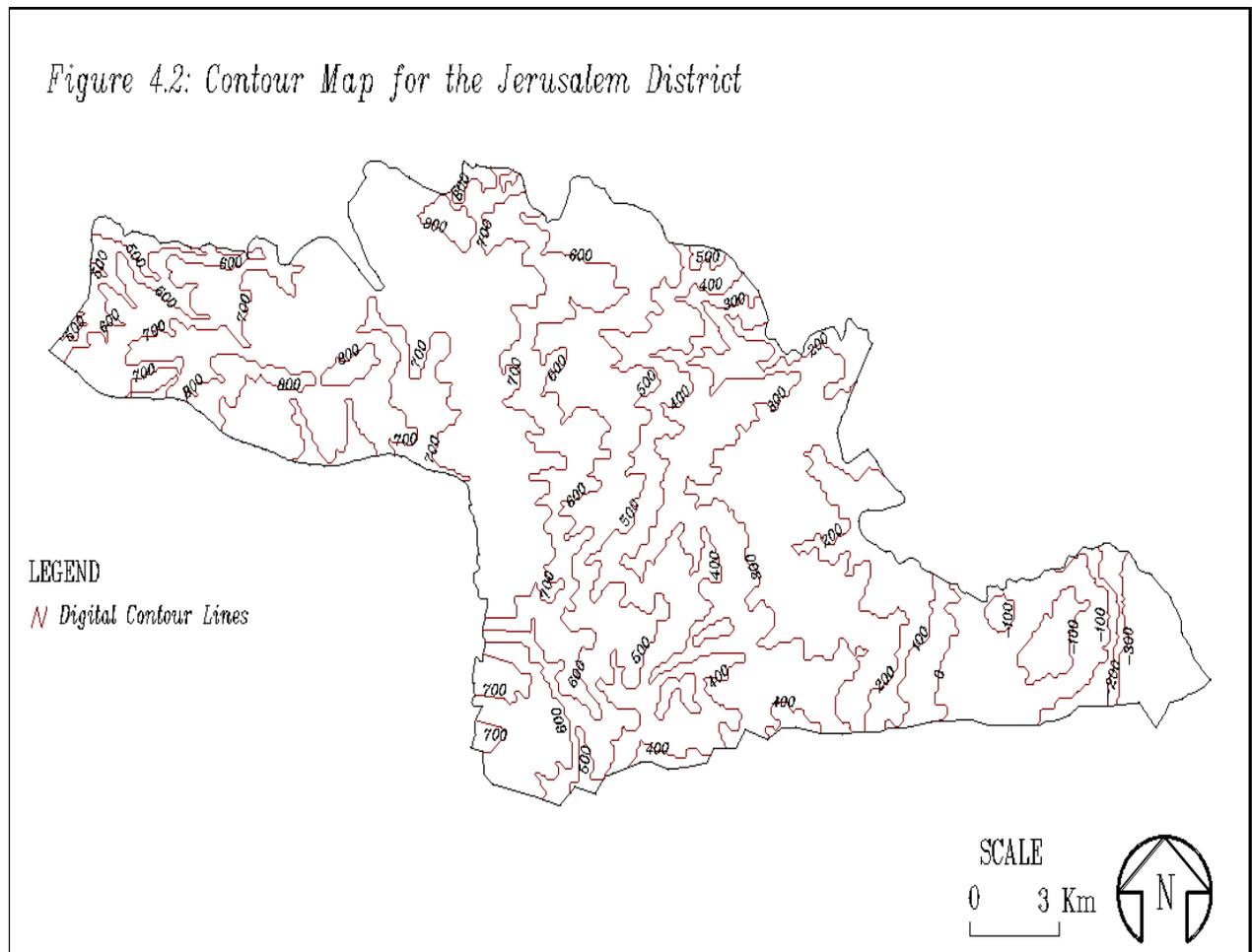
The information on the topography of Jerusalem District is concluded from a Digital Elevation Model (DEM) which was prepared at ARIJ, based on topographic maps produced by the British Mandate Government and the US Army Corps of Engineers in 1942 and 1956 respectively. The DEM has a pixel size of 100 m with each pixel containing a Z-value to indicate elevation. This model is constructed using the finite difference technique of the Topographer Model of the Pamap GIS software version 4.2. The finite difference technique is considered to be suitable for using trend data as the input data. The trend data represents the overall shape of the terrain. It is usually presented as contour lines but can also be displayed as three dimensional lines of varying elevations.

[Figure 4.1](#) represents the DEM for the Jerusalem District, which is themed using the threshold table with an interval of 100 m. Themes are colored values that give a quick and effective method for identifying features and areas that meet specified criteria. The threshold table simply makes the GIS software color each pixel with a different pre-selected color coding, based on the elevation of each pixel.



**Figure 4.1: DEM for Jerusalem District**

Based on the created digital elevation model, a contour map was constructed with a contour interval of 100 m (Figure 4.2). Accordingly, the highest point in the Jerusalem District is 880m above sea level located at an area called Radar Hill, while the lowest elevation is 367m below sea level at the southeast corner of the district, adjacent to the Dead Sea.



**Figure 4.2: Contour map for Jerusalem District**

The mountain system in the Jerusalem District is composed of three main groups, the eastern slopes' hills, central mountain crests, and western slopes' hills. The eastern slopes' hills are located between the Jordan Valley and the central mountains. They are characterized by steep slopes which contribute to the formation of young wadis. The altitude of these eastern hills ranges between 100 and 250 meters above sea level.

The central mountain crests form the watershed line which separates the eastern and western slopes. This group averages in elevation between 750 and 880 meters above sea level. Its main mountains are:

- Mount Nabi Samuel (*Samuwil*): Also known as Mount Joie, located approximately five miles north east of Jerusalem city at an altitude of 875 meters above sea level. The mountain is at least 150 meters higher than the surrounding areas which makes it the most distinctive in the district. A mosque named after Prophet Samuwil is built near the top of the mountain ([Chapter 11](#)).
- Mount Masharif: Also called Mount Scopus, begins at an area north of Shua'fat and ends near the Mount of Olives. It reaches to an elevation of approximately 825 meters above sea level and is separated from the Mount of Olives by a valley known as Wad el-Joz. Large area of the mountain is used as a campus for the Hebrew University.
- Mount of Olives (*Jabel Al-Zaytoon*): Also called At-Tour, located east of the Old City and south of Mount Masharif at an elevation of approximately 820 meters above sea level. From the top of the Mount, one can see a clear and wonderful view of the Old City and several surrounding areas in East Jerusalem. The Mount also has a great religious significance to Christians and several churches and monasteries ([Chapter 11](#)). The mountain was given this name because of the many olive trees which used to heavily cover it. Few of these trees remain. The valley of Wadi Al-Nar (Wadi Qidron) separates the Mount of Olives from the Old City.

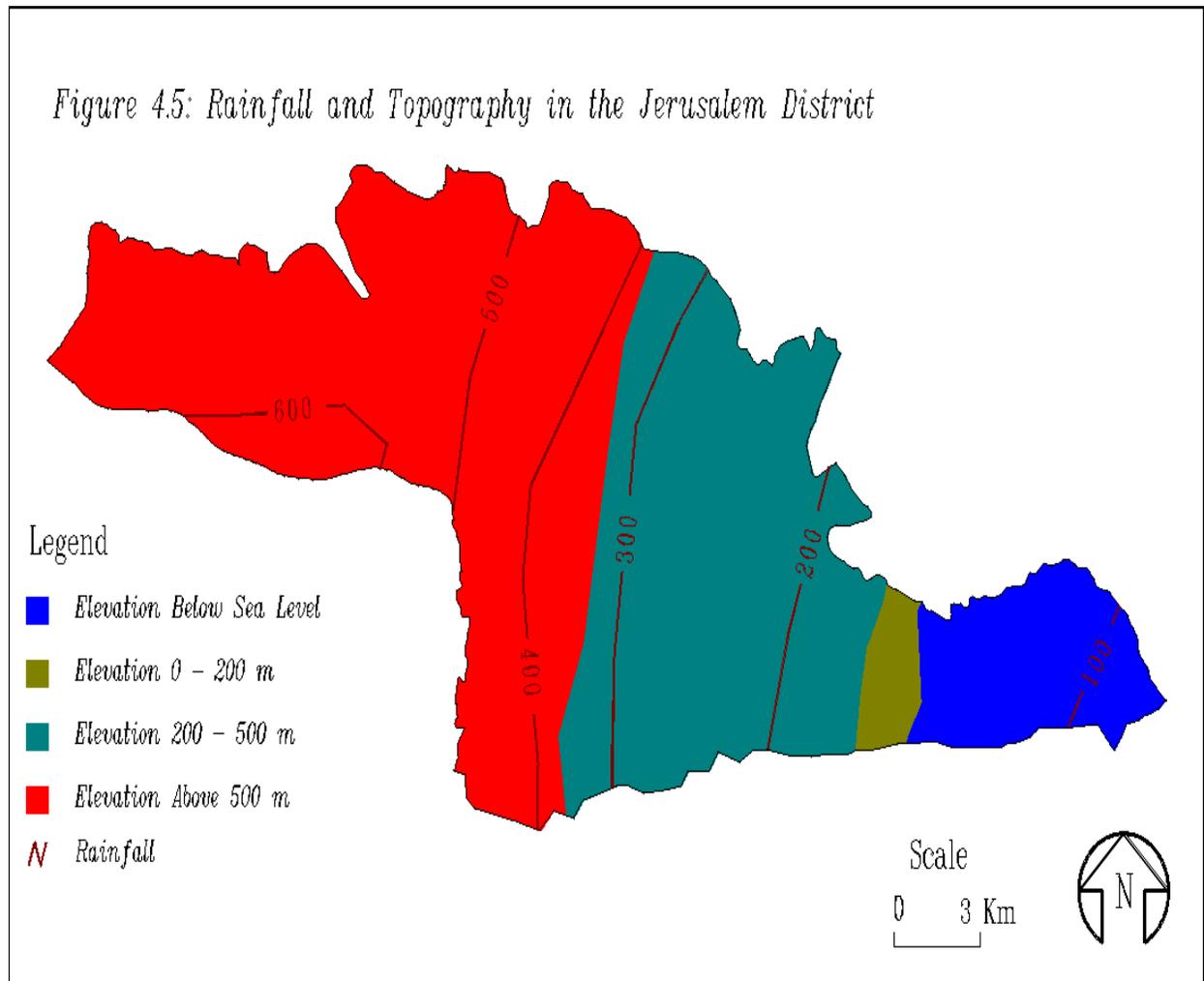
The western slopes' hills are gently sloping, and have an elevation ranging from 250 to 300 meters above sea level.

Two main drainage systems are distinguished in Jerusalem district. The first system runs to the west, such as wadi Salman. The second system runs to the east and southeast, such as wadi Soneit, wadi Farah, wadi el Mukallak, wadi Daber and wadi Al-Nar ([Figure 4.3](#)).



## Climate

As mentioned in the previous section, the Jerusalem District is characterized by a decline in altitude towards the east to its lowest point at approximately 367 meters below sea level near the Dead Sea. Accordingly, the eastern parts of the district are characterized by warmer temperature, higher evaporation rates and lower rainfall ([Figure 4.5](#)).



**[Figure 4.5: Rainfall and topography in the J.D.](#)**

The climate and weather data for the Jerusalem District are available through two weather stations, one located in the center of Jerusalem city and the other in the Kalia area near the Dead Sea. The Central Jerusalem station readings are representative of the western and central parts of the district, while the Kalia station readings, on the other hand, are representative of the eastern parts of the district.

The records of the Central Weather Station in Jerusalem for the period 1964-1992 show that the maximum daily average temperature in these areas is 28.64°C in August, while the minimum daily average temperature is 6.12°C in January ([Figure 4.6](#)) (Israeli

Meteorological Services, 1994). The long term average annual rainfall reaches 584 mm, where the rainy season starts later in the year than in the semi-coastal areas of the West Bank. Rainfall reaches its peak between mid-January and mid-February (Figure 4.7) and the number of rainy days per year averages 55.

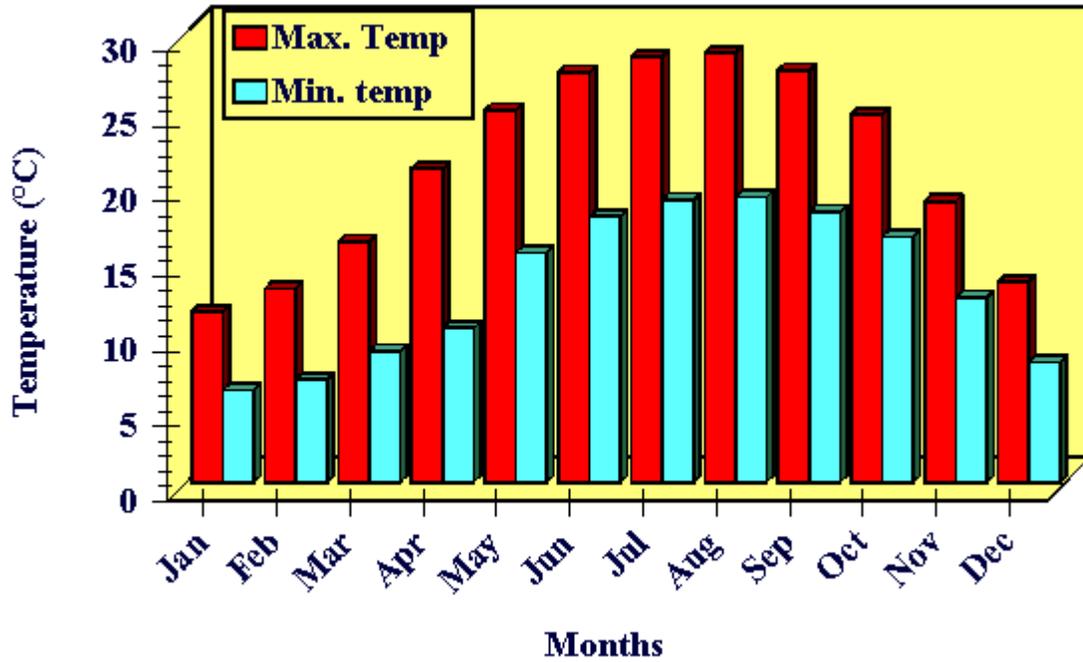
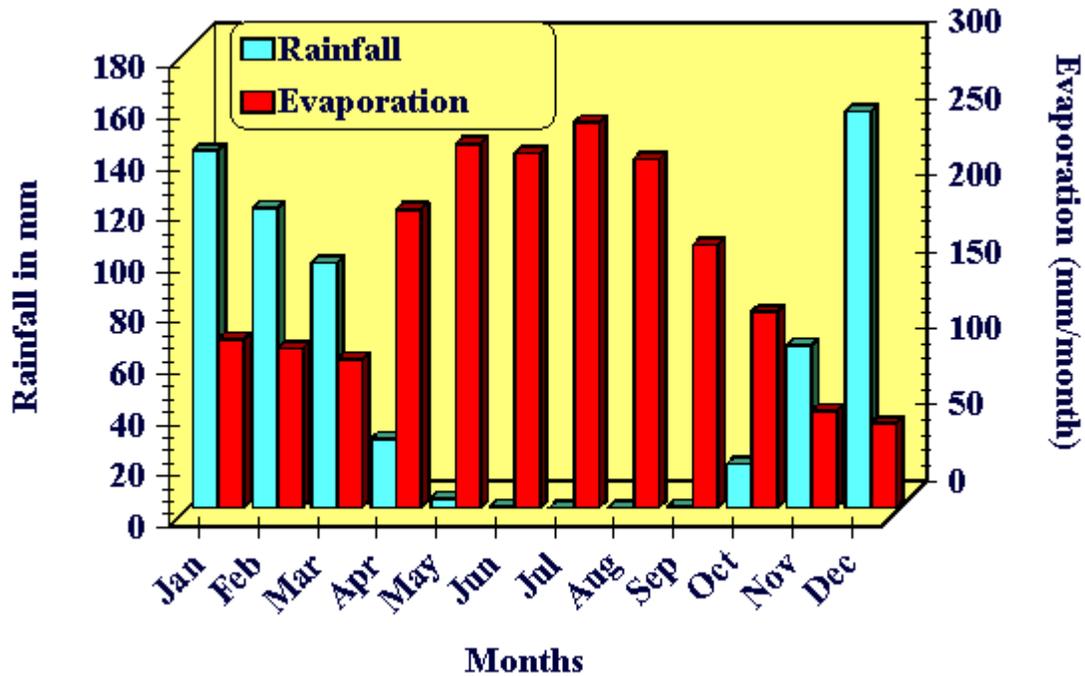
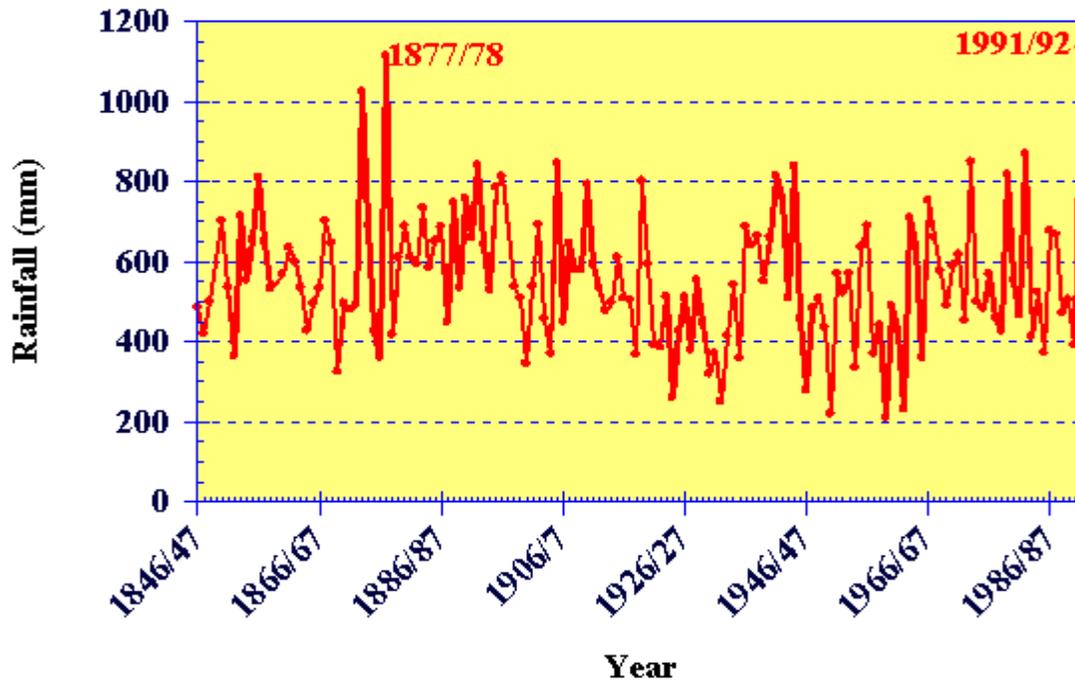


Figure 4.6: Average monthly temperature in the central and western parts of the Jerusalem District.



**[Figure 4.7: Average rainfall and evaporation rates in the central and western parts of the Jerusalem District.](#)**

Rainfall records for a station located at St. Anne Cathedral in the Old City of Jerusalem were obtained for the period between 1846 and 1964 ([Central Water Authority, 1967](#)). This data, with data compiled with other sources for the years 1965 to 1993 are listed in [Appendix II](#) and presented in [Figure 4.8](#). This data shows two major peaks in annual rainfall. One was in 1877/78 where rainfall was 1,112 mm and the other was in 1991/92 where rainfall reached 1,134 mm.

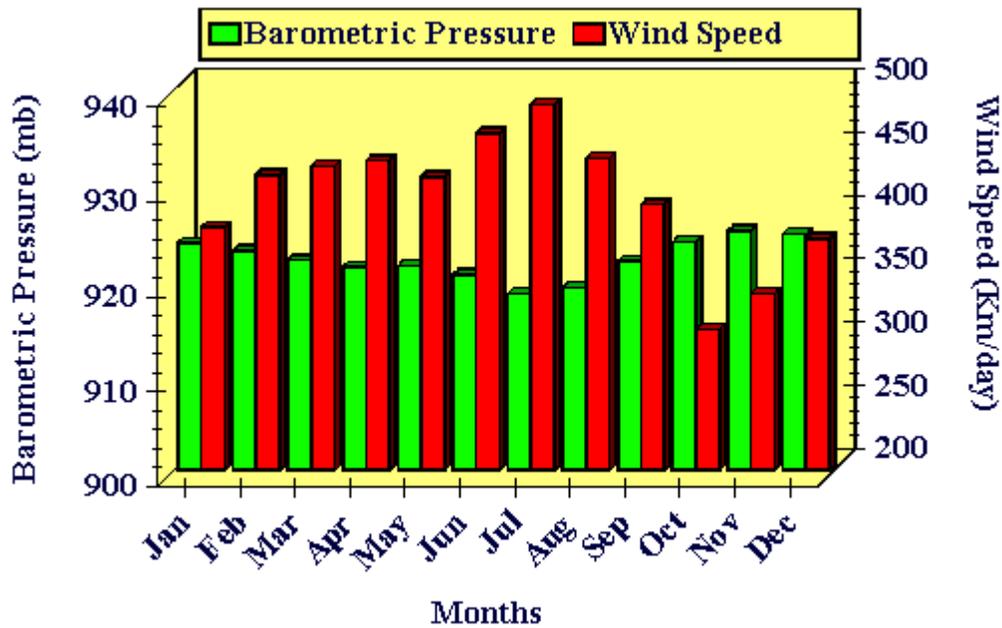


**Figure 4.8: Rainfall in Jerusalem City between 1846 and 1993**

Snow, although sporadic, falls on the area around twice a year on average. Snow usually falls on the highest parts of the Jerusalem District, in January or February.

Evaporation is particularly strong in summer, due to high temperatures, cloudless sky, and low air humidity. The average monthly evaporation as measured by the pan method at the Jerusalem central weather station reaches 1,874 mm per year, with a maximum monthly evaporation rate of 252 mm in July and a minimum of 55 mm in December ([Figure 4.7](#)).

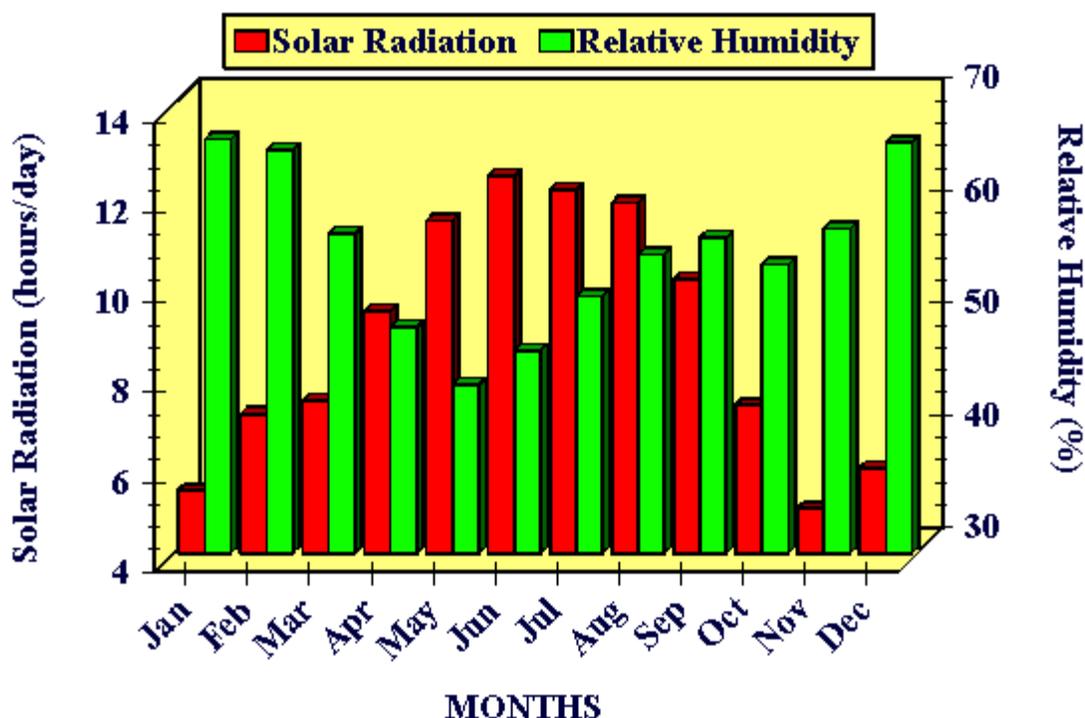
Barometric pressure in the western parts of the Jerusalem District averages 921.25 mb. The long term records shows that the minimum barometric pressure averages 918.64 mb in July and the maximum averages 925.21 mb in November ([Figure 4.9](#)). The average daily wind speed in the district ranges from 311.45 km/day in October to 489.21 km/day in July ([Figure 4.9](#)).



**Figure 4.9: Average monthly Barometric Pressure and Wind Speed in the central and western parts of the Jerusalem District.**

The average daily hours of solar radiation vary from 5 hours in November to 12.4 hours in June ([Figure 4.10](#)).

The average annual relative humidity in Jerusalem averages 56.94 percent which is lower than in the coastal plain, except in the winter months. During the khamaseen wind (hot, dry and sandy winds blowing from the deserts of Saudi Arabia), the area passes through an extremely low humidity period which may continue for several days. The minimum average monthly humidity reaches 45 percent in May and a maximum of 66.9 percent in January ([Figure 4.10](#)).



**Figure 4.10: Average monthly solar radiation and relative humidity rates in the central and western parts of the Jerusalem District.**

Table 4.1 shows long term monthly averages of the various climatic parameters in the Jerusalem central meteorological station during the period 1964-1992 ([Israeli Meteorological Services, 1994](#)).

Month	Rainfall (mm)	Maxim. Temp. (°C)	Minim. Temp. (°C)	Pressure (mb)	Evap. (mm/month)	Wind Speed (km/d)	Relative Humid. (%)	Solar Rad. (hs/day)
Jan.	140.13	11.37	6.12	923.94	110	392.13	66.9	5.4
Feb.	117.70	12.92	6.85	923.17	104	433.25	65.9	7.1
Mar.	96.12	16.03	8.74	922.18	97	440.6	58.5	7.4
Apr.	26.91	20.91	10.28	921.42	195	445.0	50.13	9.4
May	3.63	24.79	15.28	921.60	238	431.7	45.0	11.4
Jun.	0.30	27.33	17.72	920.59	232	466.42	48.06	12.4
Jul.	0	28.37	18.85	918.64	252	489.21	52.89	12.1
Aug.	0	28.64	19.01	919.25	228	446.67	56.58	11.8
Sept.	0.29	27.49	18.05	922.04	172	410.21	58.13	10.1
Oct.	17.04	24.50	16.35	924.09	128	311.45	55.75	7.3

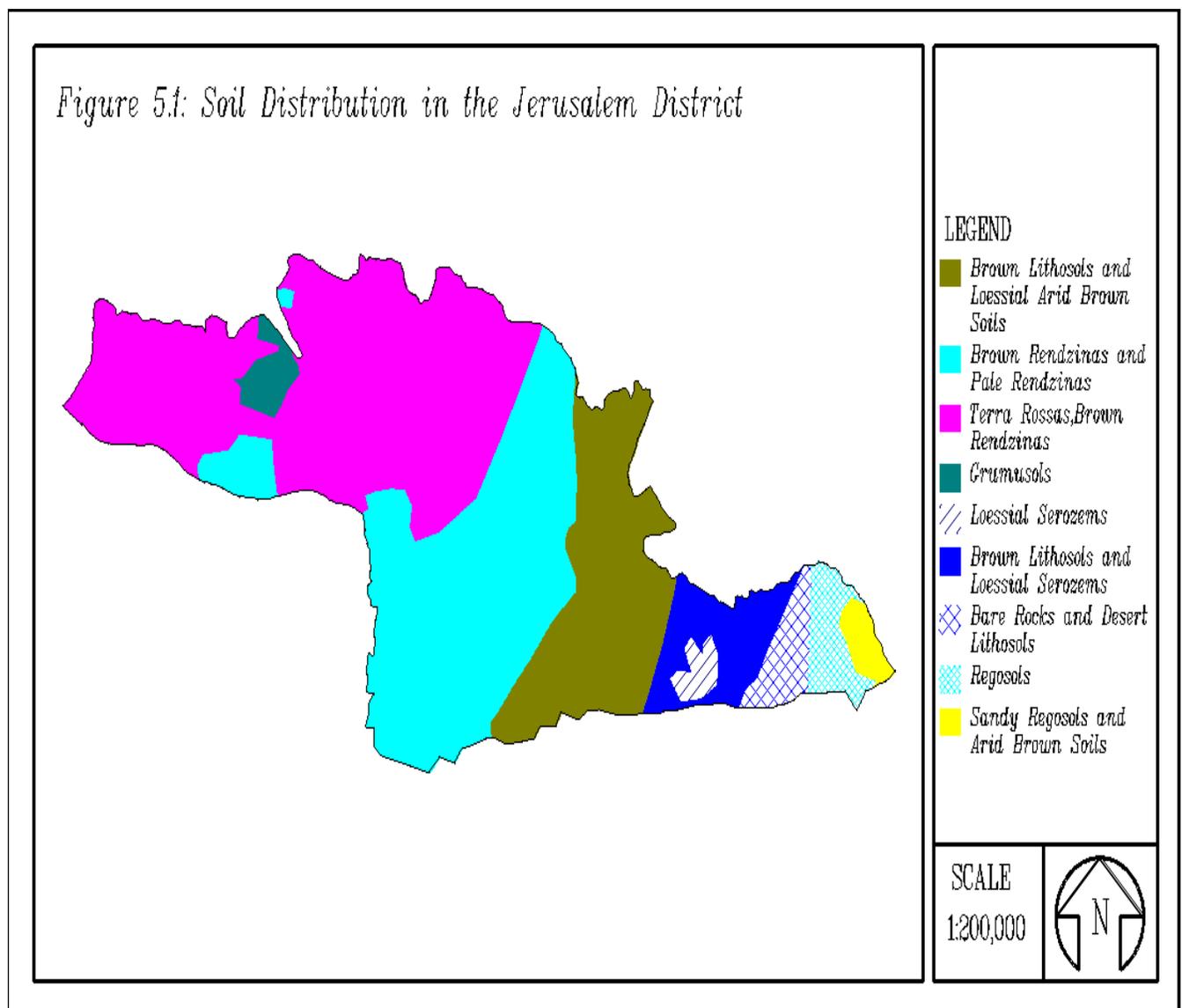
<b>Nov.</b>	63.77	18.73	12.31	925.21	63	339.89	58.92	5
<b>Dec.</b>	155.34	13.34	7.99	924.92	55	382.86	66.58	5.9
<b>Monthly Average</b>	584.23*	21.2	13.13	922.25	1874*	415.78	56.94	8.77
* = Year total								
Source: <a href="#">Israeli Meteorological Services, 1994.</a>								

The eastern parts of the Jerusalem District have a unique climate as it is situated in the area of the lowest altitude in the world. The average monthly air temperature in this area ranges from 30-32°C in the summer and 15-20°C in the winter. The lowest daily temperature is approximately 7°C in January, while the highest daily temperature is approximately 46°C in June ([Hosh, 1995](#)). The annual rainfall in this area averages 170 mm and evaporation rates are extremely high, averaging 2,600 mm annually ([Hosh, 1995](#)).

## Chapter Five Soil And Agriculture

### Soil

Information on soils and their associations is based on the analysis of soil maps which were produced by the Israeli Ministry of Agriculture ([Ministry of Agriculture, 1976](#)). The Jerusalem District is composed of at least 9 different major soil associations, as shown in [Figure 5.1](#) and summarized in Table 5.1. These are:



## 1. Grumusols

This soil type covers an area of approximately 530.8 hectares and is found mainly in areas of smooth to gently sloping topography, such as in El Jieb village. This type of soil is originally formed from fine textured alluvial or aeolian sediments. The primary natural vegetation in this soil is almost destroyed. Today, what appears is segetal vegetation of the *Prosopis farcata* - *Scolymus maculatus* association. The potential of this type of soil for agricultural production is limited, mostly appropriate for wheat cultivation. The American great classification that represents this soil type is *Xererts*.

## 2. Terra Rossa, and Brown and Pale Rendzinas

These soil types form an association which dominates the areas of A'nata, Shua'fat, Hizma, Jaba', Mukhmas, Kafr A'qab, Er Ram, Beit Hanina, Qalandia Camp, Bier Nabala, Beit Duqu, Beit Surik, Beit A'nan, El Qubeiba, Biddu, Beit Ijza, and Qatanna. This soil association collectively covers an area of 12,576.42 hectares, approximately 40% of the Jerusalem District area. Out of this area, around 3050% is outcropped with rocks. The major native vegetation cover in this association is *Quercus calliprinos*, *Pistacia palaestina*, *Pistacia lentiscus*, *Pistacia atlantica*, and *Amygdalus korschinskii*. The dominant land use pattern is field crop cultivation, mainly wheat and barley, and vineyards, olive and fruit trees, particularly on valley shoulders. The American great group classifications that represent this soil association are *Xerochrepts* and *Haploxerolls*.

## 3. Brown and Pale Rendzinas

These soil types form the association which dominates the area of Jerusalem City (Al Quds), El Tur, El 'Eizariya, Abu Dies, Es Sawahra Esh Sharqiya, Abu Mughier, Dhahrat El Mugharah, Kh. Ez Zarora, and Beit Ikhsa, covering an area of 9,652.95 hectares. Similar to the previous soil types, rock outcrops in this association are almost 3050% of the area. Major vegetation types in this soil association include *Pinus halepensis*, *Pistacia lentiscus*, *Pistacia palaestina*, *Quercus ithaburensis*, *Ceratonia siliqua* and *Ballotetalia undulatae*. In these soil types, cultivation of grapes and olives, field crops (wheat and barley), and pasture plants is the main land use, especially on shallow areas and steep [Figure 5.1](#): Soil Map for J. D.

slopes. According to the American great group classification, this soil combination represents the association of *Xerorthents*, and *Haploxerolls*.

## 4. Brown Lithosols and Loessial Arid Brown Soils

This soil association covers an area of 5,354.48 hectares. It characterizes the eastern slopes of the district and is mainly found on steep to moderate rocky and eroded slopes. Brown lithosols are found in the pockets among the rocks. Loessial arid brown soil is

found on flat hilltops, plateau and footslopes. The parent rocks of this soil association are chalk, marl, limestone and conglomerates. The major vegetation types growing in this soil are *Ballotetlia undulatae* and *Aretemisietea herbaealbae*. The American great classifications which represent this soil association are *Haploxeralfs Torriorthents* and *Xerochrepts*.

## **5. Brown Lithosols and Loessial Serozems**

This soil association is found on steep to moderate mountain slopes, covering an area of 1,759.5 hectares in the eastern parts of the Jerusalem District. It is originally formed from limestone, chalk, dolomite and flint rocks. The major vegetation types found in this association are *Anavasetea articulatae* and *Zygophyllum*, and land use pattern is mainly restricted to winter crops grown by Bedouins in a few wadis. The American great group classification that represents this soil association is *Haplargids*.

## **6. Loessial Serozems**

This type of soil is found on plateau and moderate slopes of the eastern parts of the district, covering an area of 344.63 hectares. The parent material of this soil is loessial sediments, gravel, and highly calcareous loamy sediments. The major vegetation in this soil is an association of the *Hammadion scopariae*. Most of this soil area is used for grazing and only small part of it is dryfarmed. The American great group classification that represents this soil is *Haplargids*.

## **7. Regosols**

This type of soil characterizes the eastern border of the Jerusalem District, covering an area of 911.96 hectares. It forms the badlands along terrace escarpments in the Jordan Valley. The parent material of this soil is sand, clay, and loess. The dominant vegetation types are *Anabasis articulata*, *Salsola vermiculata* and *Salsola tetrandra*. The area covered with this type of soil is primarily used for grazing. The American great group classifications that represent this soil type are *Xerochrepts*, *Calciothids* and *Gypsiothids*.

## **8. Bare Rocks and Desert Lithosols**

This soil association covers some parts of the eastern slopes of the Jerusalem District, extending over an area of 841.97 hectares. It is originally formed from hard limestone, dolomite, and chalks mother rocks, and is generally characterized by bare rocks and shallow soil depths. The major vegetation that grows in this soil is shrubs, mainly *Retama roetam*, *Anabasis articulata*, and *Zygophyllum dumosum*. The use of this soil is currently limited to grazing, in particular, where natural valleys and depressions occur. The American great group classification that represents this soil association is *Torriothents*.

## 9. Sand Regosols and Arid Brown Soil

This soil association characterizes the eastern extremity of the Jerusalem District covering an area of 418.47 hectares, generally dominating the alluvial valleys. The parent rocks of this soil are sand and loessial deposits. Because of their appropriate physical and drainage properties, this soil association is generally poor, except when used for irrigated horticulture. *Artemisia monosperma* and *Lolium multiflorum* are the major natural vegetation grown in this soil. The American great group classifications that represent this association are *Haploxeralf* and *Terripsammments*.

### Agriculture

The study of the agricultural areas in Jerusalem is quite a complicated process. As large parts of the Jerusalem District were classified as belonging to the Bethlehem and Ramallah Districts, no data on agriculture which are limited to areas within the Jerusalem District's boundaries are available. Most data give land areas or production figures which are for Ramallah or Bethlehem as a whole. Distinction between areas common between the three districts is totally lacking. Therefore, information included in this section is deprived from the analysis of land use maps, aerial photos, and field survey.

The total area of cultivated land in the Jerusalem district is roughly estimated at 2,157 hectares. This area is divided between fruit trees, occupying approximately 1,020 hectares, and field crops and vegetables, occupying 1,136.8 hectares. Most of the agricultural areas are in areas surrounding Palestinian villages. Agriculture inside East Jerusalem is mostly limited to backyard gardens and a few fragmented hectares of land.

Olive trees are the dominant among the fruit trees. Stone fruits, vineyards, figs and almonds are also abundant in the district but to a lesser extent than olive trees. Most fruit trees are located in the central and western parts of the district. Most fruit trees are dependent on rainfall. The few trees that are irrigated are usually planted in yards of Palestinian houses. Due to the low rainfall and topography, the eastern part of the district is almost totally void of fruit trees, especially in the parts east of Hizma village (Figures [4.5](#) and [6.1](#)). Fruit trees, especially olives, are mainly planted on terraced mountain slopes and hilly areas ([Photo 5.1](#)).



*Photo 5.1: Fruit trees in the Qubeiba area.*

**Table 5.1 - Summary of the Major Soil Associations in the Jerusalem District**

Soil Association	Area (ha)	American Classification	FAO Soil Unit Classification	Location	General Characteristics	Natural Vegetation	Rainfall (mm)	Mean temp. (°C)
1. Grumusols	530.8	<i>Xererts</i>	<i>Vertisols</i>	Area with smooth to gently sloping topography	Parent material is fine textural alluvial or aeolian sediments.	<i>Prosopis farcata-Scolymus maculatus</i>	300-700	19-21

2. Terra rossa, brown and pale rendzinas	12,576.42	<i>Xerochrepts</i>	<i>Luvisols, Cambisols, Lithosols and Rendzinas</i>	Central mountains	Terra rossa type, the parent materials are dolomite and hard limestone, the soil depth varies from shallow to deep (0.52m) Xeric moisture regime, deep in hilltops and shallow in sloppy mountainous areas. Soil has a reddish brown color with subangular blocky structure.	<i>Quercus calliprinos, Pistacia palaestina and Pistacia lentiscus.</i>	400700	15-20
		<i>Haploxerolls</i>		Small plateau of the mountains	Same as Xerochrepts with the exception that it has a base saturation of 75%.			

3. Brown & pale rendzinas	9,652.95	<i>Xerorthents</i>	<i>Rendzinas and Lithosols</i>	Sloping hills	Xeric moisture regime, it has a reddish brown color. Soil structure is crumbly. Texture is loamy or clay, about 30% is stony. Parent material is soft chalk and marl.	<i>Pinus halepensis</i> and <i>Pistacia palaestina</i> .	600700	1519
		<i>Haploxerolls</i>		Valleys and depressions	Xeric moisture regime. It has dark reddish brown color with clay and with gentle slope. Parent rocks are marl and chalk.	<i>Quercus ithaburensis</i> , <i>Pistacia lentiscus</i> , <i>Ceratonia siliqua</i> and <i>Ballotetalia undulatae</i> .	300700	1820
4. Brown lithosols & loessial arid brown soils	5,354.45	<i>Haploxeralfs</i>	<i>Lithosols and Xerosols</i>	Eastern slopes	Marl, chalk, limestone and conglomerates parent rocks.	<i>Ballotetalia undulatae</i> , <i>Aretemisietea herbae-albae</i> .	200350	19-21
		<i>Torriorthents</i>			Xeric moisture regime, the soil has ochric surface epipedon with low organic matter < 0.6% and massive structure. Parent material is loessial sediments.			
5. Brown lithosols and	1,759.5	<i>Haplargids</i>	<i>Lithosols and Yermosols</i>	Steep to moderate mountain	Of yellowish brown or very pale brown	<i>Anavasetea articulatae</i> and	80-200	17-23

Loessial Serozems				slopes	color, coarse texture and subangular structure. Parent rocks are limestone, chalk, dolomite and flint.	<i>Zygophyllum</i>		
6. Loessial Serozems	344.63	<i>Haplargids</i>	<i>Yermosols</i>	Plateau and moderate slopes	Of yellowish-brown to brown in color, and coarse texture. Parent materials are loessial sediments, gravel and highly calcareous loamy sediment.	<i>Hammadion scopariae</i>	150-250	20-21
7. Regosols	911.96	<i>Xerochrepts Calciothids and Gypsiotids</i>	<i>Regosols</i>	Badlands along terrace escarpments in the Jordan Valley	Of pale brown color, loamy texture. Parent materials are sands, clays and loess.	<i>Anabasis articulata, Salsola vermiculata and Salsola tetrandra</i>	150-260	22-24
8. Bare rock and Desert lithosols	841.97	<i>Torriothents</i>	<i>Lithosols and Solonchaks</i>	Eastern slopes	Bare rocks, rarely small depth of soil.	<i>Retama roetam, Anabasis articulata, and Zygophyllum dumosum.</i>	80-100	14-23
9. Sand Regosols and Arid brown soil	418.47	<i>Haploxeralf and Terripsamments</i>	<i>Xerosols</i>	The tip of the eastern border of the District	Generally characterize the alluvial valley. Parent rocks are sand deposits, and loessial deposits.	<i>Artemisia monosperma - Lolium multi florum.</i>	150-250	20

Field crops and vegetables are cultivated mainly under rainfed conditions, with field crops occupying a larger percentage of the total area. Barley, wheat, and bitter vetch are the main kinds of field crops in the Jerusalem District, and are mostly planted in the eastern parts of the district. Vegetables are usually cultivated in the central and western parts of the district, mostly in and around Palestinian villages.

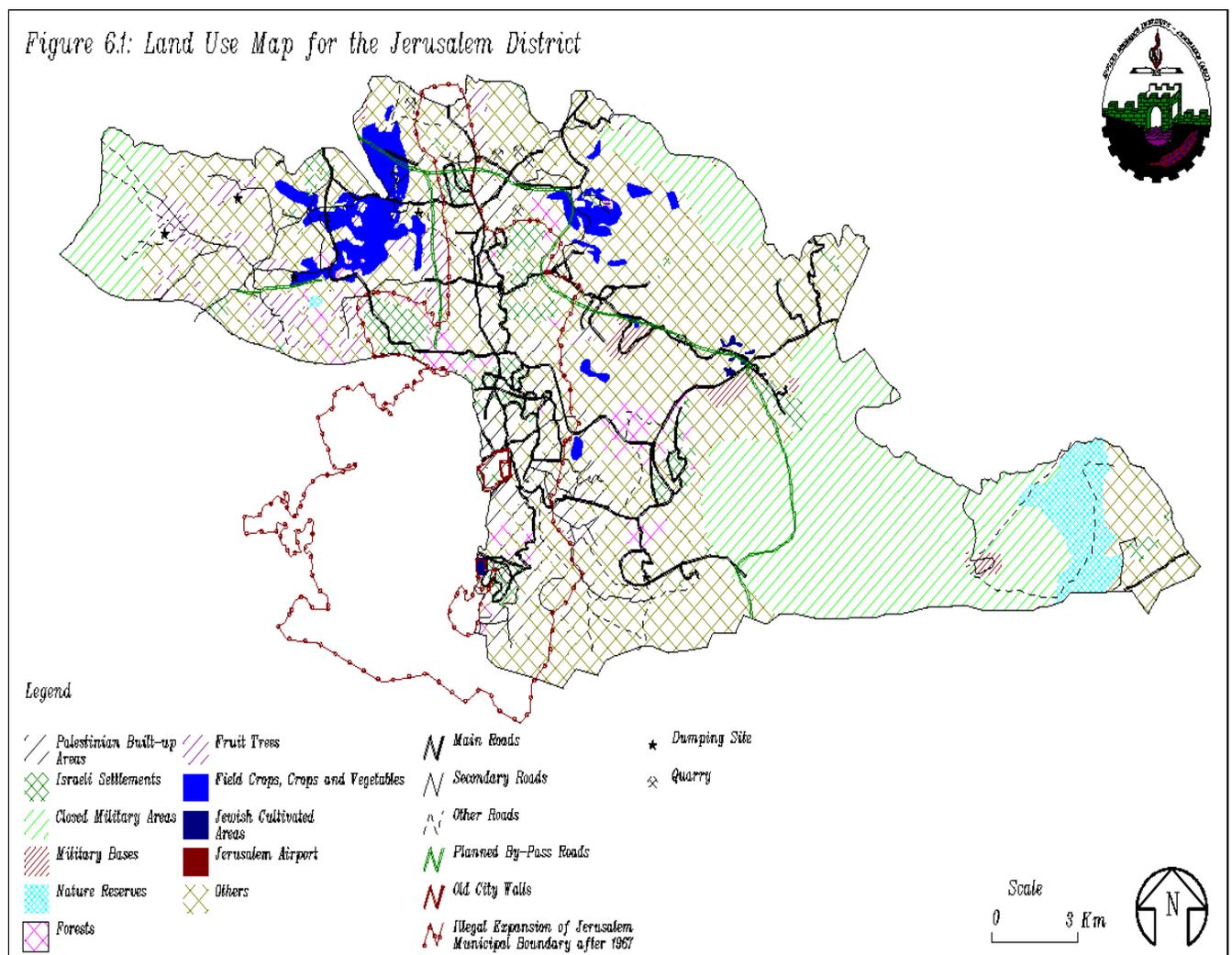
The agricultural produce from this district was mainly and regularly marketed in the city of Jerusalem. However, due to the Israeli closure of East Jerusalem, it has become difficult to transport products into the city. Marketing became is now done locally or in the Ramallah area.

Although no figures were available for clear calculations, the comparison of the 1942 British Mandate maps for Palestine with the current maps shows a substantial decline in the agricultural areas. Many agricultural lands were converted into built-up areas, others were confiscated for building Israeli settlements or opening new roads. The agricultural sector in the Jerusalem District is also affected by the low rainfall and shortage of water for irrigation. The resulted low productivity of rainfed farming had pushed many farmers to abandon working on their land and take jobs elsewhere, especially in Israel.

The agricultural sector in Jerusalem District is threatened by the current political and economic atmosphere. Limitations on the permitted areas for building houses by Palestinians in East Jerusalem have led to building homes on the agricultural areas close to or within these boundaries. Large areas of land were lost because of this policy. Other lands were totally lost to the expansion of existing Israeli settlements or building new ones. Marketing of products became limited after the closure of the East Jerusalem boundary. A mitigation program is needed to promote the agricultural sector and stop further destruction of agricultural land.

## Chapter Six Land Use

The total area of the Jerusalem District is approximately 32,306.3 hectares, stretching east-west direction to form a 'Z' shape (Figure 6.1). The land use patterns in this area are greatly influenced by topography, climate, and the political conflict over land and natural resources. Such factors affect the distribution of crops, urban areas, road construction, and other land uses. For simplicity, the land use patterns in this chapter are classified into six main categories. These are:



## I. Built-Up Areas

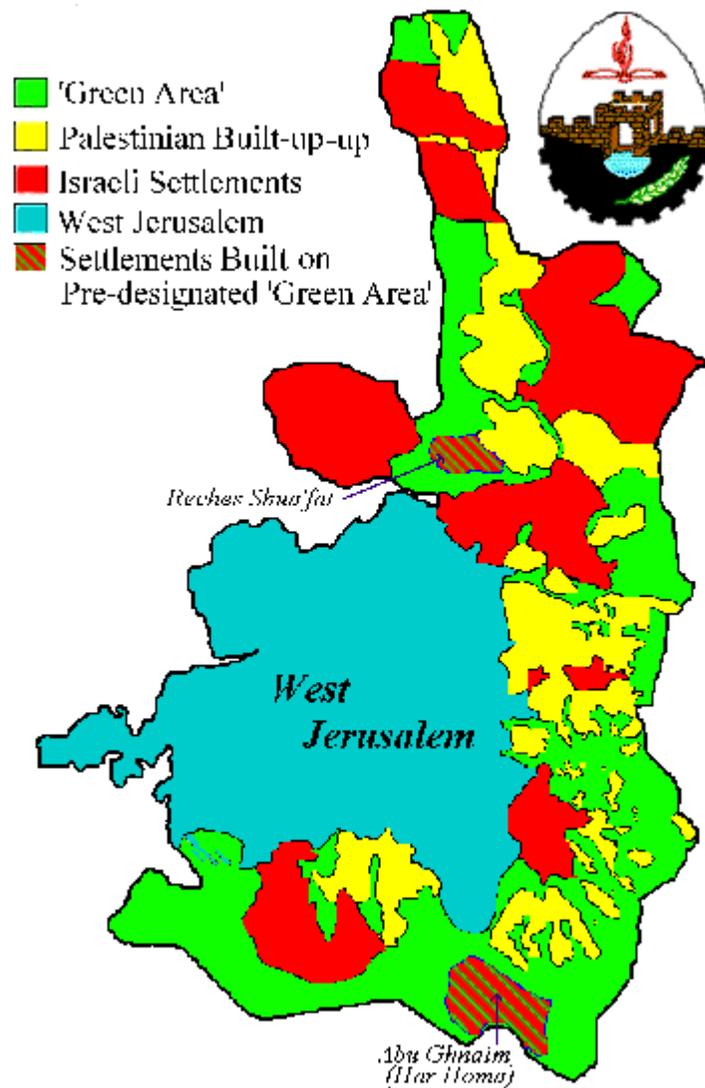
### a- Palestinian BuiltUp Areas

The Palestinian builtup areas in the Jerusalem District are distributed over 38 major communities, including the city of Jerusalem, two refugee camps, villages and hamlets. The Palestinian built-up area occupies a total area of approximately 1,990 hectares of land, constituting around 6.16% of the total District's area.

Most of the Palestinian built-up areas are concentrated in and around East Jerusalem. Several villages of low population exist in the western part of the district while not a single Palestinian built-up area exists in the eastern parts. This is mainly due to the restrictions imposed by the Israeli government on Palestinian building and settlement in the eastern parts of the District. The Israeli government declared most of this part of the district as a closed military area, nature reserve or state land. Israeli settlements, however, do not fall under these restrictions, and many have been built on the eastern parts of the Jerusalem District after they were declaring to be closed military areas ([Figure 6.1](#)).

The limitation on the Palestinian built-up areas in East Jerusalem is not very different from in the eastern part of the district. Although 85-90% of the land of East Jerusalem belongs to Palestinians, presently, only 13.5% of East Jerusalem area is left available for the Palestinians to build on, live, and develop ([Kaminker, 1995](#)). The restriction on Palestinian built-up areas in East Jerusalem has been conducted under the umbrella of Town Planning Scheme (TPS) which the Israeli Municipality of Jerusalem formulated for Jerusalem.

Soon after the 1967 war, Israel canceled the town planning schemes that were prepared and approved by the Jordanians in 1966 for East Jerusalem and then prevented Palestinians from building in areas without approved schemes ([Kaminker, 1995](#)). As of today, 28 years later, very few Palestinian towns had their TPS approved by the Israeli Jerusalem Municipality. The process for approving the TPS for a Palestinian community has been made very complicated and requires several stages and uncountable signatures. Presently, less than 25% of the Palestinian neighborhoods of East Jerusalem have a complete and approved town planning scheme ([Arab Studies Society, Map Unit, 1995](#)). Moreover, in those few "lucky" towns, major parts of the land were designated as 'Green Areas'. 'Green Areas' are areas designated for public open space or for the preservation of unhindered views of the landscape; they simply can not be built on ([Kaminker, 1995](#)). The color green predominates Palestinian town plans in East Jerusalem ([Figure 6.2](#)). Because of this policy, building houses for Palestinians in East Jerusalem has been extremely difficult, and led to overcrowding to a point where more than 30% of East Jerusalem Palestinian families live in a density of more than 3 people per room ([Figure 2.4](#)).



The TPS for East Jerusalem has divided the area into the following:

**Table 6.1: TPS for East Jerusalem.**

Land Use	%
Israeli settlements	34%
For expansion of Israeli settlements	8.5%
Green Areas	44%
Palestinian built-up	13.5%
<b>Source: PASSIA, 1996</b>	

This land classification of East Jerusalem practically translates to an average living density in East Jerusalem of over 13,962 individuals per square kilometers (Both Israeli settlers and Palestinians). Israeli settlers, however, enjoy an average density of 5,340 individuals per square kilometers, while for Palestinian Jerusalemites it is an average density of 17,245 people per square kilometers.

Furthermore, restrictions are imposed by the Jerusalem Municipality on construction even when building permits are granted. These restrictions are expressed in the following building codes ([Kaminker, 1995](#)):

- Palestinians are only allowed to built on 15%, 25%, or 50% of the land plot as floor space, depending on the zoning and area of construction. In contrast, Israeli Jews building in East Jerusalem settlements are allowed to build with a floor space as much as 200% of the land.
- Palestinian buildings in East Jerusalem are confined to one or two stories, whereas Israeli settlements can have buildings up to eight stories.
- Palestinians owning land larger than 0.1 hectare in size are required to divide the land into parcels of a maximum of 0.1 hectare in order to be granted building permits on such lands. This law is strictly applied even when the land is only few square meters larger than 0.1 hectares.

These discriminatory laws cause low efficiency of land use and restrict the number of houses that can be built of the limited area given for Palestinian to develop and inhabit. Since 1967, only 6,440 new Palestinian houses have been built in East Jerusalem (12% of all newly constructed houses), compared to over than 60,000 new houses which were built by Israeli settlers during the same period of time ([PASSIA, 1996](#)).

Many Palestinian houses built with no license have already been demolished and many more are threatened with demolition by the Israeli government. As Reported by the Palestine Human Right Information Center (PHRIC) in mid 1994, the result of the Israeli government policy of denying Palestinians building permits, demolishing unlicensed Palestinian houses, and expropriating land was that approximately 21,000 Palestinian families were either homeless or live in caves and tents, are inadequately housed, or are forced to double and triple-up with other families ([Krystall, 1994](#)). As of 1993, PHRIC has documented over 210 Palestinian homes demolished by the Israeli authorities in East Jerusalem since mid-1986 for licensing reasons. In contrast, the Israeli city comptroller reported 2,019 Israeli houses built in Jerusalem with no license in 1992 (compared to 226 violations in East Jerusalem) and 1,509 cases in 1993. None of these illegally built Israeli houses were demolished, and most were granted a retroactive license approval ([Kothari & Abu Shakra, 1995](#)).

Palestinian communities of East Jerusalem are becoming overcrowded and can not handle the population pressure. This policy is adversely reflecting on the natural and socio-economic environment in the Palestinian communities, which is further exacerbated by the weak infrastructure and insufficient municipal services.

Furthermore, most of the lands designated as 'Green Areas' in East Jerusalem, which are supposedly left to conserve the beauty of the nature, are neither planted, developed into gardens or parks, nor green. Obviously these 'Green' areas were selected in places where Israel would like to save the land until the time is ready to build Israeli settlements on them. Sarah Kaminker, a city planner and a member of the Jerusalem City Council, in one of her articles quoted Teddy Kollek, the previous mayor of Jerusalem, "when asked to defend the loss of 1,262 dunums of public open space in Rekhes Shu[a]'fat, Mr. Kollek stated that the green paint was originally applied to the map of Rekhes Shu[a]'fat in order to prevent Palestinian construction on the land until the time was ripe to build a new neighborhood for Jews." ([Kaminker, 1995](#)).

The settlement of Rekhes Shua'fat is one of many areas where an Israeli settlement was built on a pre-designated green area. A forested mountain located at the southern end of the 1967 extended East Jerusalem municipal boundary is another example ([Figure 6.2](#)). This mountain, called Abu Ghnaim (Har Homa, in Hebrew), which hosts approximately 60,000 pine trees and provides shelter for an uncountable number of wild plants and animals, is currently threatened by a new settlement that is planned to be built on its location. [Appendix IV](#) outlines an environmental profile and impacts assessment of this planned settlement on the neighboring areas.

The overall Palestinian built-up areas in the Jerusalem District are built on soil types which are very suitable for Agricultural purposes. These soils include the associations of:

- Brown Rendzinas and Pale Rendzinas Soils;
- Terra Rossa, Brown Rendzinas and Pale Rendzinas;
- and Grumusols.

## **b- Israeli BuiltUp Areas**

There are at least 25 major Israeli settlements in the Jerusalem District, occupying an area of approximately 1,563 hectares (4.84% of the total District's area). Most Israeli built-up areas in the Jerusalem District were constructed after 1967, and mostly on land confiscated from its Palestinian owners.

In East Jerusalem, there are at least 15 major settlements which are located in areas surrounding the Palestinian communities and in a manner that prevents their growth and development. Presently, these settlements contain at least 60,000 housing units and several thousands more are under construction ([PASSIA 1996](#)). The area specified by the Jerusalem Municipality for Israeli settlements and their expansion is estimated at 42.5% of the total area of East Jerusalem.

To by-pass the law concerning the prerequisite of having approved Town Planning Schemes before granting building permits, the Israeli Jerusalem Municipality devised a 'spot zoning' technique. In spot zoning, the municipality would survey the areas where

settlements are to be built and prepare Town Planning Schemes for them while excluding any adjacent Palestinian neighborhoods or land from such scheme. Furthermore, to facilitate the Israeli occupation of land, the Israeli government has provided, over the years, subsidized housing for over 70,000 Israeli (Jewish) families living in East Jerusalem, compared to 555 Palestinian families (News from Within, July 1994).

Israeli settlements in the Jerusalem district are generally located on soils which are very suitable for agriculture and as range lands. These soils are:

- Brown Rendzinas and Pale Rendzinas Soils;
- Terra Rossa, Brown Rendzinas and Pale Rendzinas;
- Grumusols;
- Brown Lithosols and Loessial Arid Brown Soils; and
- Sandy Regosols and Arid Brown Soils.

## **II. Closed Military Areas and Bases**

The closed military areas take up a large amount of the Jerusalem District, occupying an area of approximately 7,966.7 hectares (24.7% of the District's area). The Israeli government claims that these areas are important as security zones and for military training purposes. In addition, there are 9 military bases, with a total area of approximately 307.97 hectares. The areas are located on similar soil associations to that occupied by the Israeli built-up areas:

- Brown Rendzinas and Pale Rendzinas Soils;
- Terra Rossa, Brown Rendzinas and Pale Rendzinas; and
- Brown Lithosols and Loessial Arid Brown Soils.

## **III. Nature Reserves**

Three areas in the Jerusalem District are presently declared as nature reserves. Two of them are located in the eastern parts of the district. The third nature reserve is located in the western side of the district, half way between Beit Iksa and Beit Surik. The overall area of these three nature reserves is 867.63 hectares, and mostly located in uncultivated lands in the district.

## **IV. Forests**

There are 15 major forests in the Jerusalem District, occupying an area of approximately 860.93 hectares. Most of them are planted in fertile soil types (Terra Rossa, Brown

Rendzina, and Pale Rendzinas) and in areas of favorable climatic conditions for agriculture.

Afforestation in the Jerusalem District was first implemented during the British Mandate and the Jordanian governments in areas east of mount of Olives, near the present settlement of Ma'ale Adumim. To the east, the Jordanians planted an additional forest, stretching for approximately one kilometer and covering a steep slope. Not a single tree of this forest survived to the end of 1967 due to human activities. Although these forests were relatively small in size, they occupied high grounds and stood out in the middle of the barren environment surrounding them (Cohen, 1993). A third Afforestation project which the Jordanian government started was at the Mount Abu Ghnaim area (Presently inside the 1967 extended boundaries of East Jerusalem). The work in this forest was interrupted by the 1967 war, and the forest was completed by the Israelis (Appendix IV).

Afforestation projects by Israel in the Jerusalem District took more of a political nature. They have been mostly concentrated in and around East Jerusalem. This is primarily an attempt to create a green belt around the city and restrict the expansion of its Palestinian communities. Such policy is affirmed by the present TPS for East Jerusalem (see above).

From map analysis, it became clear that the Israeli afforestation in the Jerusalem District is also carried out in areas separating Israeli settlements from their neighboring Palestinian communities. Such forests create buffer zones between the two communities and prevent the expansion of the Palestinian communities on lands which are to be saved for the expansion of Israeli settlements. The forests east of Pisgat Ze'ev and Neve Ya'acov are two examples (Figure 6.1). Similarly, the forests planted around Ma'ale Adumim serve the purpose of securing the land between Ma'ale Adumim and Jerusalem and around the settlement itself (Cohen, 1993).

## V. Cultivated Areas

<b>Description</b>	<b>Area in Hectares</b>
Field Crops, Crops and Vegetables	1,136.77
Fruit Trees	1,020.81
Jewish Cultivated Areas	42.54
<b>Total</b>	<b>2,200.12</b>

These are described in more details in [Chapter 5](#). However, the following table (Table 6.2) summarizes the areas left for agriculture in the Jerusalem District:

## VI. Roads

The Jerusalem District has a road network of approximately 164.4 Km of main roads (those connecting towns and villages together) and 83.7 Km of main in-town roads. Road conditions in most areas outside the East Jerusalem boundary are generally bad and lack maintenance. Most villages in the district are connected together and with major cities through a network of unpaved dirt roads or narrow paved roads with uncountable holes and bumps. The only well maintained roads are those that connect to Israeli settlements. It became ironically known that whenever a road is well paved or widened, it usually connects to an Israeli settlement or a new Israeli settlement will be built in that area. The road which connects the French Hill Settlement with Giva'at Ze'ev and Giv'on Hadasha, passing through Ramot settlement, is an example. The road connecting Neve Ya'acov and Pisgat Ze'ev with Ma'ale Adumim settlement is another example.

Expanding on items in the Oslo-II agreement between the Palestinians and Israelis, Israel started planning and opening new 'by-pass' roads to connect the various Israeli settlements in the West Bank with each other. Three of these by-pass roads will be opened in the Jerusalem district, with a total length of 36.5 Km. The first road will be an extension of a by-pass road originating from the southern part of the West Bank. It will pass by the settlements Qedar, Site, A'lmon, Mishor Adumim, Pisgat Ze'ev, Adam, A'tarot Industrial Zone and continue out of the northwestern part of the district into Ramallah District and towards Israel proper. The second by-pass road is a split of the first one, originating to the east of A'tarot Industrial zone and heading south to end near Ramot Alon and Rekhes Shua'fat (Figures [1.2](#) and [6.1](#)). The third road will connect the Nabi Samuwil area with the Giva'at Haradar settlement passing through the lands of Palestinian village of Beit Ikhsa.

The by-pass roads, which are usually 50 meters in width and have 75 meters of buffer zones on both sides, will be built on Palestinian agricultural lands. Such by-pass roads will certainly have an adverse effect on the Palestinian environment and destroy crops.

The responsibility to develop and improve the road network in the areas outside East Jerusalem, except for the settler by-pass roads, was recently given to the Palestinian Authority. However, because of the Authority's low budget and the many high priorities and projects that the Palestinian areas need, it is expected that little work will be done in the near future to improve the road network in the Jerusalem District.

In the East Jerusalem area, approximately 180 km of roads exist in the East Jerusalem municipal area, compared to 460 km in West Jerusalem ([Arab Studies Society, Maps Center, 1995](#)). The Israeli Jerusalem municipality specified only a small portion of its annual budget to handle the road network problem in the Palestinian neighborhoods the problem increases every year with the increasing population and the lack of planned housing arrangements.

Information on a ring road to be built in East Jerusalem was recently released by the Israeli press. The new ring road will connect the Israeli settlements in the southern part of

East Jerusalem with those in the north parts without the need to drive through downtown areas. According to project's maps, the road will originate from the Jerusalem-Hebron road at first crossroads from the southern entrance of Talpiyot, close to the Diamond center. It will continue eastwards, crossing through several agricultural lots in the Ramat Rahel area, pass through the northern edge of the Palestinian village of Sur Bahir, and continue to pass the southern parts of Jabel Mukaber. The road will then turn towards the north, passing through a planned tunnel to the Mount of Olives and from there link up with Ma'ale Adumim Road near Mount Scopus. An Extension will then continue east of Pisgat Ze'ev and finish at the Israeli settlement of A'tarot Industrial Zone ([Jerusalem Post, 1995](#); [Arab Studies Society, Map Center, 1996](#)).

This ring road may also serve as a *de facto* separation line between East Jerusalem municipal boundary and the Palestinian villages located in the eastern part of the district. Thus, the villages of Abu Dies and Al-Eizariya (which were proposed by Israel to be the new Palestinian capital in Jerusalem), as well as Hizma, Mukhmas, Jaba', and others will be separated from East Jerusalem.

<b>Land Use</b>	<b>Area (hectares)</b>	<b>% of Land</b>
Palestinian Builtup Areas	1,992	6.16
Israeli Settlements	1,563	4.84
Closed Military Areas	7,966.7	24.66
Military Bases	307.97	0.953
Nature Reserves	867.63	2.69
Forests	860.93	2.66
Jewish Cultivated Areas	42.54	0.13
Palestinian Cultivated Areas	2,157.58	6.68
Others*	16,547.95	51.22
<b>Total</b>	<b>32,306.3</b>	<b>100.00</b>
<b>* Others represent unused land, pasture areas, and roads.</b>		

The geographical build-up of many Palestinian neighborhoods and the several development projects that were carried out in the past have created sharp drop-offs and dangerous sloping areas which require large investment to build supportive sidewalks.

Table 6.3 summarizes the areas of the different land use patterns in the Jerusalem District.

In summary, the land use patterns in the Jerusalem District show inefficiency in the use of the land and environmental resources. Both Palestinian built-up areas and Israeli settlements are built on lands of extremely rich soil for cultivation. On the contrary, lands in the eastern parts of the District, where agriculture is difficult to succeed (due to low rainfall and shortage of water for irrigation) are closed and no built-up or other uses are allowed (at least to Palestinians). This has led to the spread of built-up areas and industries at the cost of agricultural land, thus reducing its size. The overcrowding and lack of permits for Palestinians to build in major parts of the district have led to inefficient use of natural resources.

To mitigate the current situation, it is extremely urgent that Israel opens the Israeli-declared closed military areas and makes them accessible to Palestinians. Restrictions imposed on building areas should be lifted and granting of building permits should be based on scientific grounds rather than political ambitions.

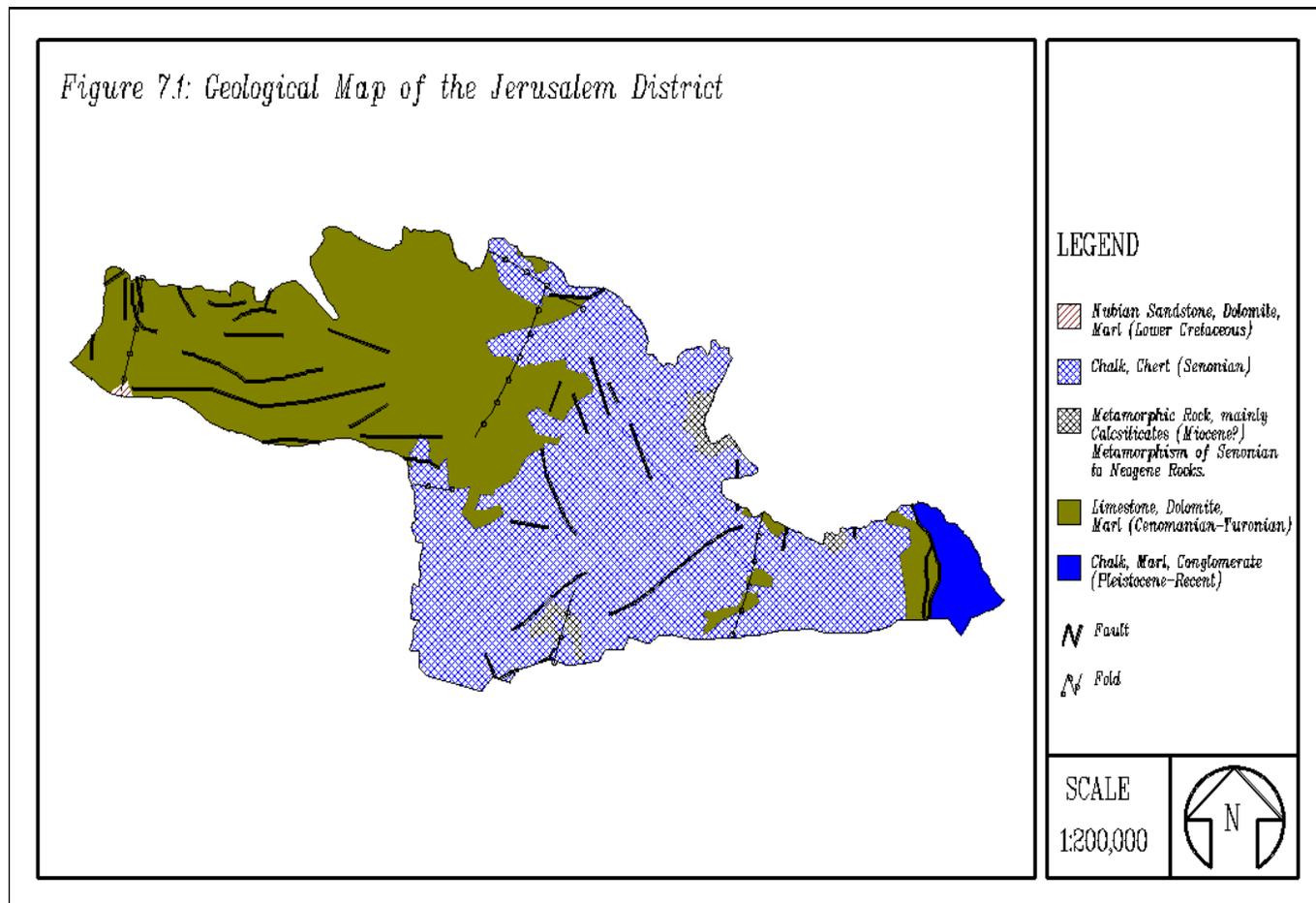
## Chapter Seven Geology And Water Resources

### Geology

The geological outcrops in the Jerusalem District are mainly composed of carbonate sediments such as limestone, dolomite, chalk and chert. They range in age from lower Cretaceous to Quaternary. Jurassic rocks are not exposed, but they were identified using boreholes.

### Geological Formations

The geological structures in the Jerusalem District consist of the following units, arranged by age from older to younger ([Figure 7.1](#)):



**Figure 7.1: Geological Map of the J.D.**

1. Nubian sandstone, dolomite and marl of lower Cretaceous age.
2. Limestone, dolomite and marl of Cenomanian to Turonian ages.
3. Chalk and chert of Senonian age.
4. Metamorphic rocks of Miocene age.
5. Chalk, marl and conglomerate of Pleistocene to Recent ages.

A more detailed study of the geology of the area shows the following formations:

- Lower Cretaceous Rocks, composed mainly of limestone, dolomite and marl.
- Upper and Middle Cretaceous Rocks, divided into the following formations:
  1. Kobar Formation: Considered to be from approximately the Aptian to Albian age, and consists mainly of limestone and marl. There is unconformity between the Aptian and Albian rocks. Towards the end of the Aptian there was a tectonic episode, which tilted the newly deposited Aptian rocks and subjected them to erosion, then the Albian rocks were deposited over the Aptian rocks. This formation is mostly an aquiclude, except the top 20-30 meters of limestone which forms a good aquifer.
  2. Lower Beit Kahil Formation: Considered to be from the lowest part of lower Cenomanian age, and indicates the beginning of the limestone sedimentation. The lowest part of the formation consists of bedded dolomitic limestone which becomes massive upwards. This formation is a moderate to good aquifer.
  3. Upper Beit Kahil Formation: Dated from the upper part of the lower Cenomanian, and is generally composed of marly limestone at the bottom, interbedded with limestone in the middle, and topped with dolomitic limestone. The marl component of this formation renders it an aquiclude except towards the top of limestone which gives it some importance as an aquifer.
  4. Yatta Formation: From the lower part of the middle Cenomanian age, and is mainly composed of chalk, limestone and marl with a fairly thick soil cover. It is a very strong aquiclude.
  5. Hebron Formation: Regarded as equivalent to the upper part of the middle Cenomanian. The base of the formation consists of dolomite and dolomitic limestone while the top consists of dolomitic limestone. This dolomitic formation renders it the most important of all aquifers.
  6. Bethlehem Formation: Corresponds approximately to the upper Cenomanian age. The northeastern part of the formation is dominated by dolomite and dolomitic limestone, while the southwestern part is particularly chalky. As a whole, this formation acts as a confining aquiclude for the Hebron formation, which is beneath.
  7. Jerusalem Formation: Extends from the upper Cenomanian to Turonian, and is marked mainly by limestone, dolomite, and marly chalk. The limestone is massive and is mined and used for building stones. The

formation as a whole is characterized by a tough limestone which makes it a good aquifer. The presence of thin marl partings near the top, however, may make some parts of this formation as a good aquiclude.

8. Abu Dies Formation: Mainly consists of chalk and chert from the Senonian age. It outcrops mainly in the Eastern Slopes of the district. Usually, the chalk is white but in some areas it takes the dark color which is due to the presence of bituminous materials. The low permeability of the chalk makes this formation a good aquiclude.
9. Khan El Ahmar formation: The actual age of this formation is suspected to be from the Danian to Maestrichtian age ([Rofe and Raffety, 1963](#)). This formation, which is mainly composed of marl and limestone, is characterized by bright colorings, of brown, red, cream, and green.

- Quaternary Rocks: divided into the following formations:

1. Lisan Formation: Mostly present in small areas close to the Dead Sea. Lithologically, it is composed of thinly laminated marl with some limestone and pebble beds. The pebbles are sometimes calcareous, and occasionally siliceous.
2. Nari Formation: It occurs as a surface crust over all rocks and particularly in areas of high rainfall. It consists of insoluble residues and rocks' remnants firmly bound together with carbonate cement.

## **Structural Formations**

### **Folds**

Two main folds dominate the Jerusalem District, Surif anticline in the south, and Ein Qiniya anticline in the north ([Fig 7.1](#)). Between these two anticlines is an asymmetrical syncline with northern extension of its northwest to southeast axis laying midway between Biddu and Beit Iksa.

The Surif Anticline passes west of Beit Jala to southern outskirts of Jerusalem. It trends north-south. Its western limb dips down steeply up to 40°. The eastern limb dips gently and forms minor folds, such as Sheikh Khalifa anticline, El Jaqma syncline and Qarn Hajar anticline.

Ein Qiniya Anticline has a north-south axis extending approximately 8 Km towards the west. The western limb of the anticline is steep with a slope of around 35°, while the eastern and western flanks form minor folds. Between this and Surif's anticline, there is a syncline.

## ***Faults***

The northwestern part of the Jerusalem District is generally more faulted than the remaining parts. The majority of these faults trend north-south and east-west, while those trending NW-SE are insignificant ([Figure 7.1](#)). In many cases the faults curve as they pass from one trend to another. Most of the faults have throws less than 50 m, while the largest may have throws of between 50-150 m. Such faults are found rarely in the area and they end over 1-2 km. Around Jerusalem, there are some fairly large East-West faults extending from the area of Beit Hanina and Shua'fat towards Latroun.

## ***Joints***

The dolomitic formations of the Jerusalem district have been most affected by joints in the area. The joints occur due to the varying competency of individual beds within the formation. Joints are often up to one meter wide, mostly filled with dirt, and allow high water infiltration to the lower formations.

## ***Earthquakes***

Through history, the Jerusalem District was hit by many earthquakes of variable intensities and frequency. Within the area under study, 37 earth movements with variable intersites have been recorded during the period from 1900-1950 (Rofe and Raffety, 1963). Of these:

- One was severe and associated with tremors;
- Five were moderate and associated with tremors;
- Seven were shocks;
- Five were tremors;
- Twelve were slight in magnitude; and
- Seven were not noticeable.

## **Water Resources**

This section on water resources in the Jerusalem District is restricted by the limited availability of data. As most of the district's water resources are under the direct control of Israel, neither water sampling nor obtaining information on wells were possible. Nevertheless, the status of the water resources will be described and analyzed according to the best information available.

## Historical Background

In ancient years, the population of Jerusalem city depended on several springs for water supply. Silwan (also called Gihon) spring was one of the major suppliers of water. As the City's population increased, there was a need to construct artificial rain water collecting reservoirs and cisterns which were connected with Jerusalem by aqueducts. The Solomon's Pools, located approximately 11.5 km south of Jerusalem in the Bethlehem area, were the largest of these water collecting reservoirs. The water from these pools was transferred to Jerusalem by gravity through a 21 km of aqueducts ([Abells & Arbit, 1995](#)).

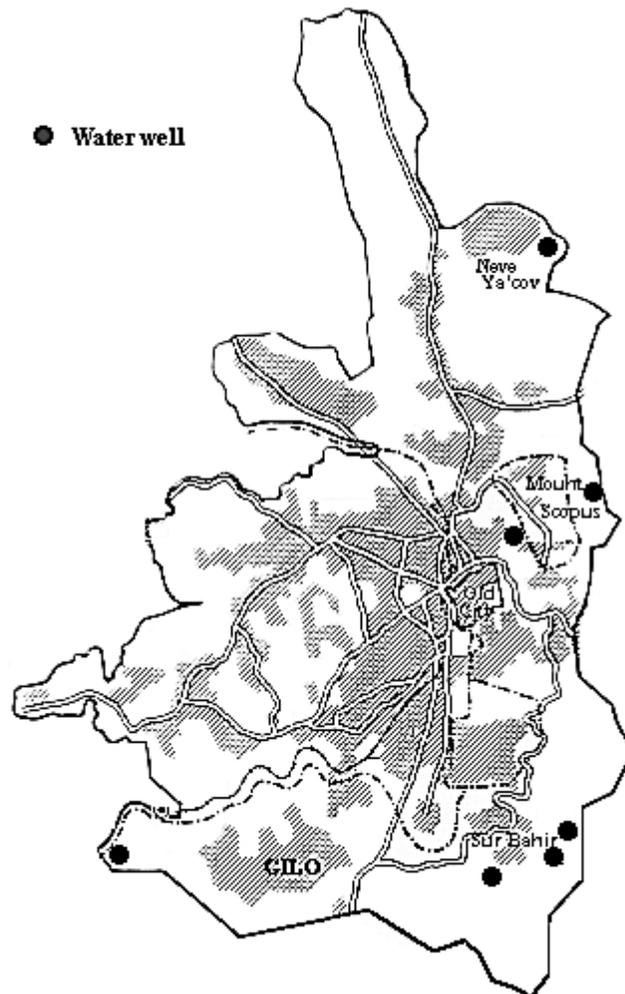
In recent history, in 1917 and after 400 years of Turkish rule, the Jerusalem city was left in desperate shortage of water. The Turkish project of 1901 to improve the water supply by laying iron pipes connecting Solomon's Pools with Jerusalem was not efficient. The water flow was still dependent on gravity and the total quantity of water reaching Jerusalem decreased within few years.

The water shortage was exacerbated by the coming of the British army to Jerusalem after they defeated Turkey in late 1917. Large number of British soldiers lived in the city, increasing water consumption. To remedy the situation, the British Army in 18 February 1918 designed a plan to supply Jerusalem with 250,000 gallons of water per day by incorporating water from the Wadi Al-Arrub springs (22 km south of Jerusalem) into the aqueduct system. The British project included also the renovation of Al-Arrub reservoir, an ancient reservoir to store Al-Arrub spring water, and the addition of several other new reservoirs to the system. The project was completed on 18 June 1918 ([Abells & Arbit, 1995](#)).

Few years later, the British Mandate government installed water pumps on several springs around Jerusalem in order to meet the increased demand on water. Pumps were installed at Solomon's Pools, and at the three springs of Ein Farah (1928), Ein Fawwar (1931), and Ein Qilt (1935), in the Wadi Qilt area ([Abells & Arbit, 1995](#)).

In 1934, the British Mandate Government began pumping water to Jerusalem from springs at Ras El Eyn in the coastal plain area. This supply was however interrupted since 1948 when the Iraqi troops occupied the principal pumping station, and cut off the water supply to Jerusalem. Currently, Ras El Eyn water supplies the Tel-Aviv and Coastal Plain areas ([Gilbert, 1978](#)).

After the 1948 war, Israel constructed 27 deep wells in the West Jerusalem area, west of the Armistice line, which severely effected the water quality and supply to East Jerusalem. After 1967 Israel occupied the West Bank and the Palestinian side of Jerusalem. Soon after, and as of 1976, Israel constructed new seven deep wells in East Jerusalem area. Three of these wells are located in the Um Tuba - Sur Bahir area, one is near Wadi Al-Joz, one on the eastern side of Mount Scopus, one is located east of Neve Ya'acov settlement, and the last one is located west of Gilo Settlement and few kilometers from Al-Walajah village in the Bethlehem District ([Figure 7.2](#)).



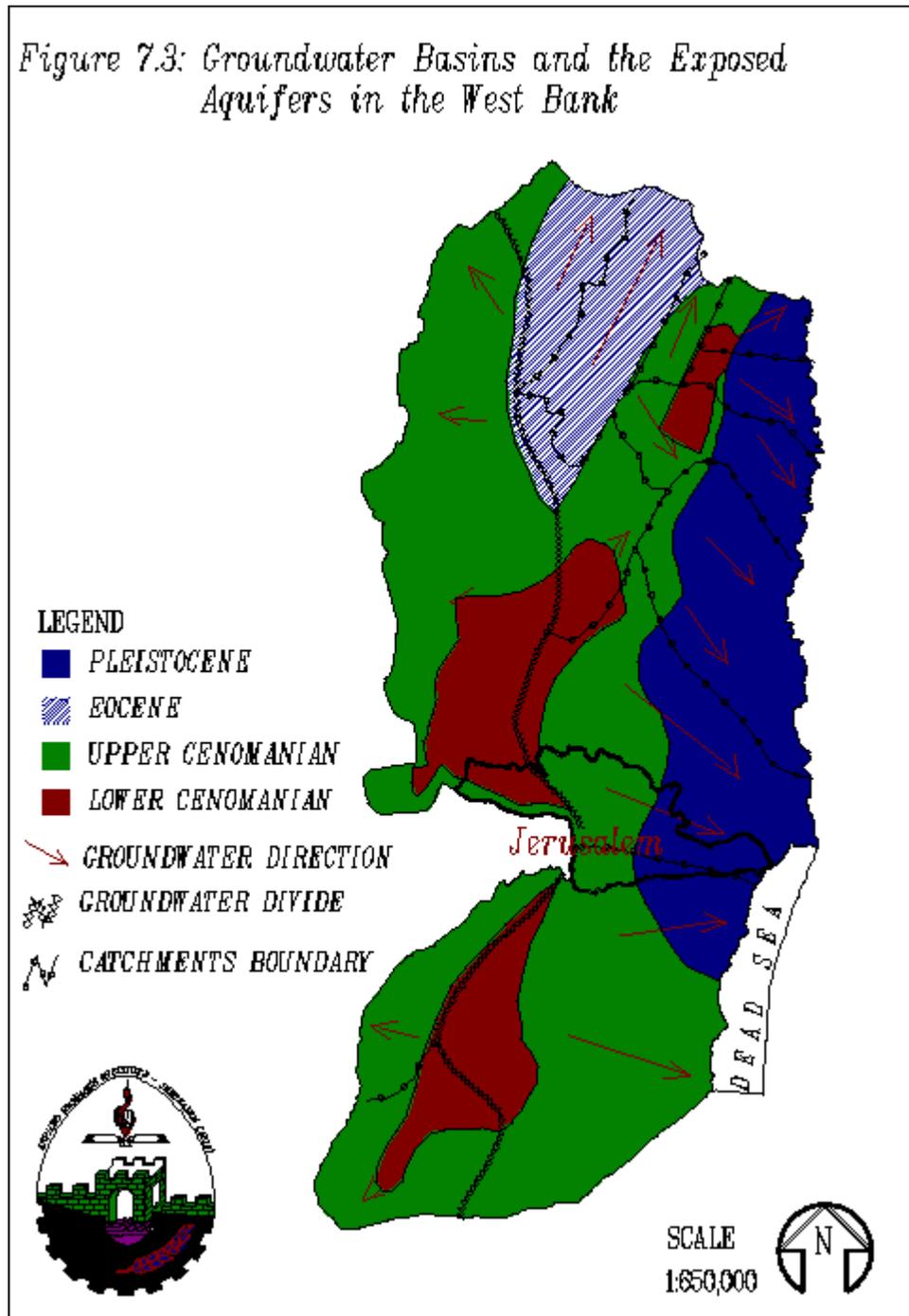
*Figure 7.2: Water Wells in the Jerusalem District, as of 1976.*

Until 1976, almost 50% of the water supply to Jerusalem (West and East sides) was provided by the Israeli National Water Carrier. There were reports afterwards that Israel intends to drill an additional ten or more wells in the area, however no comprehensive information is currently available in this regard ([Gilbert, 1978](#)). Through field work, three new ground water wells were identified in areas east of East Jerusalem. Two of these wells are located close to the entrance of Mishor Adumim settlement on the Jerusalem-Jericho road. The third well is located east of Ma'ale Adumi settlement. These wells provide water for the Israeli settlements in the nearby.

### **Groundwater Basins and Flow Patterns**

The Jerusalem District is characterized by a considerable variation in elevation between the central highlands and the low lands in the eastern and western parts of the district ([Chapter Four](#)). The topography of the district thus has a major effect on groundwater flow patterns. From a hydrological point of view, the regional groundwater shed is

located at the crest of Jerusalem city and extends in the north-south direction to separate Jerusalem district into the western and eastern groundwater basins. Each groundwater basin is also subdivided into smaller catchments and a system of aquifers (Figure 7.3).



The main three aquifer systems underlying the Jerusalem district are:

### 1. Lower Cenomanian aquifer system

This system is composed Lithologically from Limestone and dolomitic limestone. Its minor aquifer is formed from the Lower Beit Kahil formation, while its major part is composed of the Yetta formation.

### 2. Upper Cenomanian aquifer system

This system is composed of Hebron, Bethlehem, and Jerusalem formations. Hebron formation constitutes the main part of the aquifer, which can be saturated to its full thickness.

### 3. Quaternary aquifer system

This system is represented by Lisan and Alluviahn formations. These two formations together make a good property aquifer with coarse margined facies but soluble salts are high.

The eastern groundwater catchment includes two sub-catchments of Jerusalem desert and Ramallah-Jerusalem. The water of these two catchments flows towards the east and southeast, parallel with the area's topography and geology. The western groundwater catchment is represented by Auja-Temsah where groundwater flows towards the west. The higher lands in the central part of the Jerusalem District are considered as the main recharge areas for all aquifers in the district. The low lands, on the other hand, are the main discharge zones especially through springs.

## Water Sources

The available data regarding water sources in the Jerusalem District indicates that there are at least 10 wells tapping the eastern catchment area. The exact number of springs is not [Figure 7.3](#): Water Aquifers and groundwater basins in J.D.

available and their participation in the overall water supply is very limited. The only available data about water wells is shown in the following Table 7.1

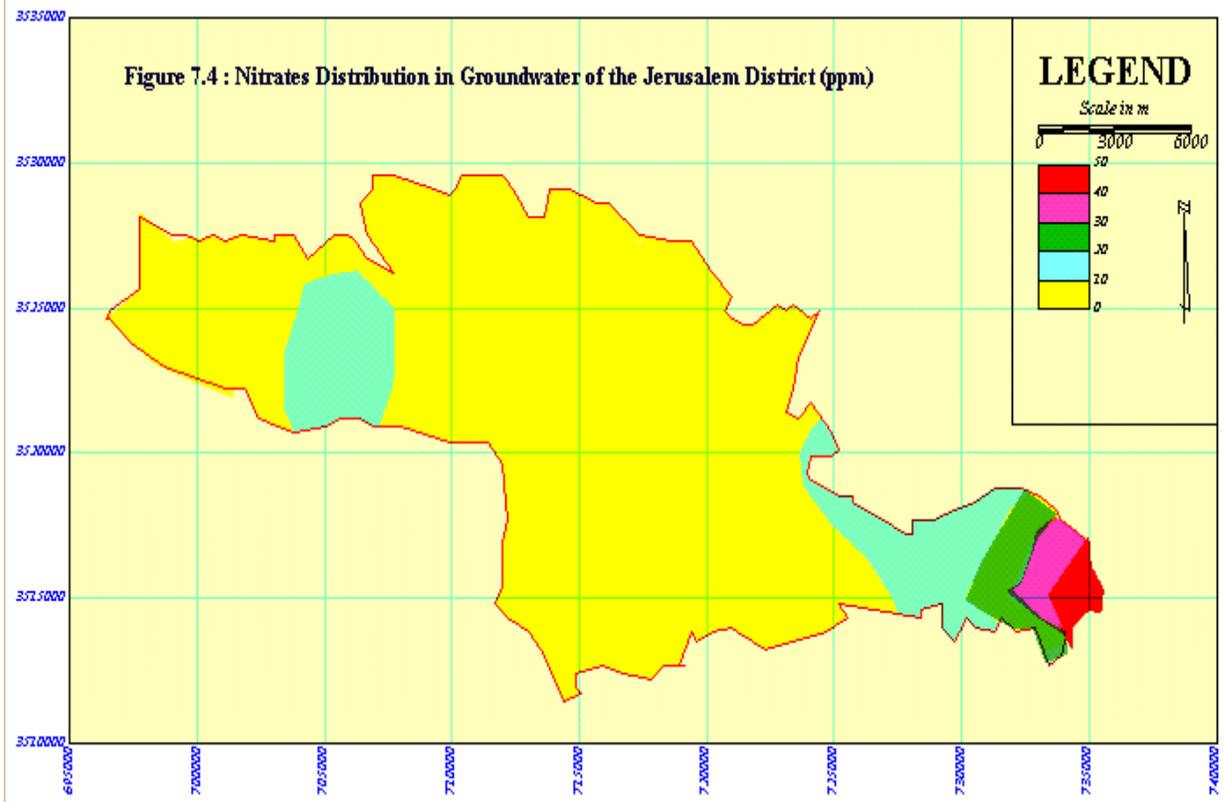
Well's Name	Aquifer	Static water level (m)	Chloride (mg/l)	X	Y	Z
Jerusalem-4	Lower Cenomanian	418	68	-	-	-

	Phreatic					
Jerusalem-5	Lower Cenomanian Phreatic	360	39	-	-	-
Ma'ale Adumim	Upper Cenomanian Phreatic	150	-	182700	138050	100
<b>Source:</b> <a href="#">Kronfield &amp; Rosenthal, 1992.</a>						

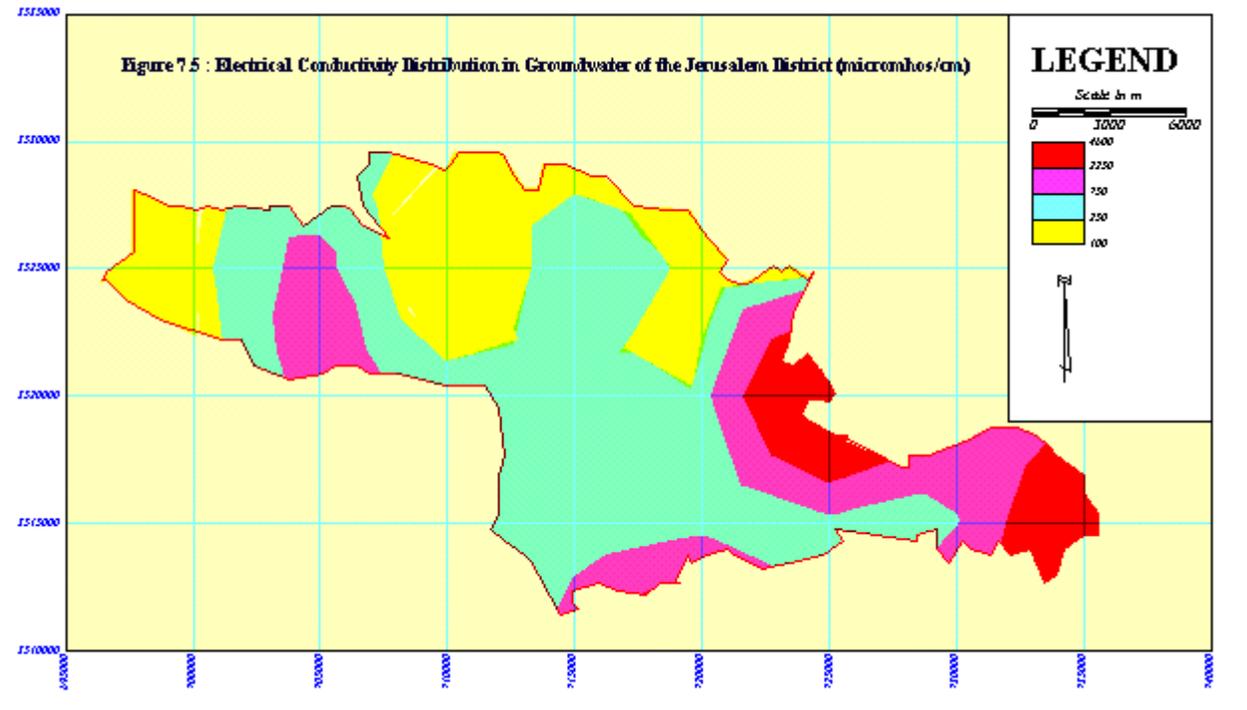
Among the major springs in the Jerusalem District is the Silwan (Gihon) spring. This spring is located in the village of Silwan south of the Old City and was historically used to provide Jerusalem with water. The presence of this spring was the main reason for building the City of Jerusalem on its current location, close to the spring. The annual flow of this spring ranges between 60 - 80 thousand cubic meters ([Abells & Arbit, 1995](#)). The annual minimum monthly flow occurs around October and is about 40,000 CM, while the maximum monthly flow occurs in January or February and is about 100,000 CM. During a rainy winter it can reach as high as 135,000 CM per month, as happened in February 1992. Through the years, the spring's flow varies between 40 to 100 cubic meters per day.

## Water Quality

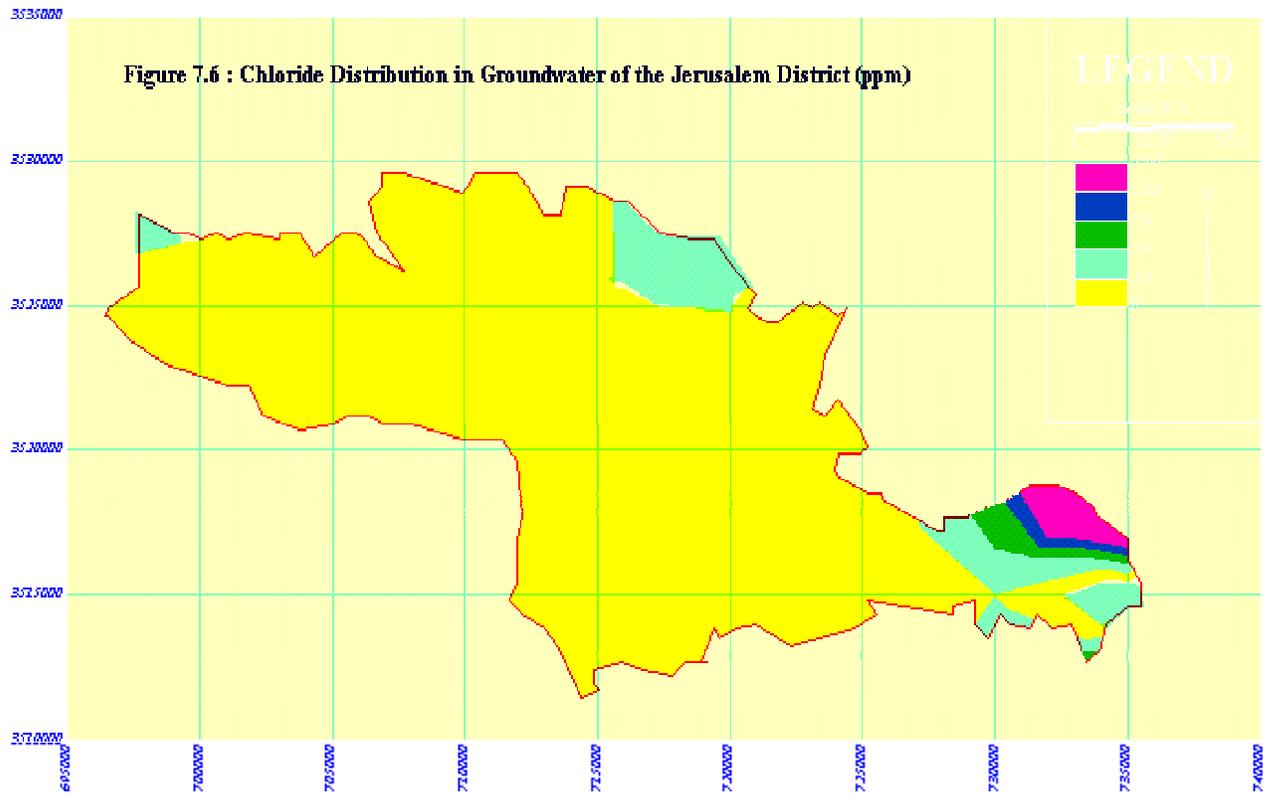
As mentioned earlier, actual data on water quality is not available for the Jerusalem District. However, projected groundwater quality maps were prepared by ARIJ based on a comprehensive sampling procedure conducted by ARIJ for most wells and springs in the neighboring districts. The Ground Water for Windows (GWW) software was used to interpolate the water quality data for those wells and springs around the Jerusalem Districts. Figures [7.4](#), [7.5](#), [7.6](#), and [7.7](#) show the outcome of the quality models in the form of isolines for EC, TDS, NO<sub>3</sub>, and Cl, respectively. The areas marked with white in each of the maps are those that are difficult to predict using the GWW interpolation method.



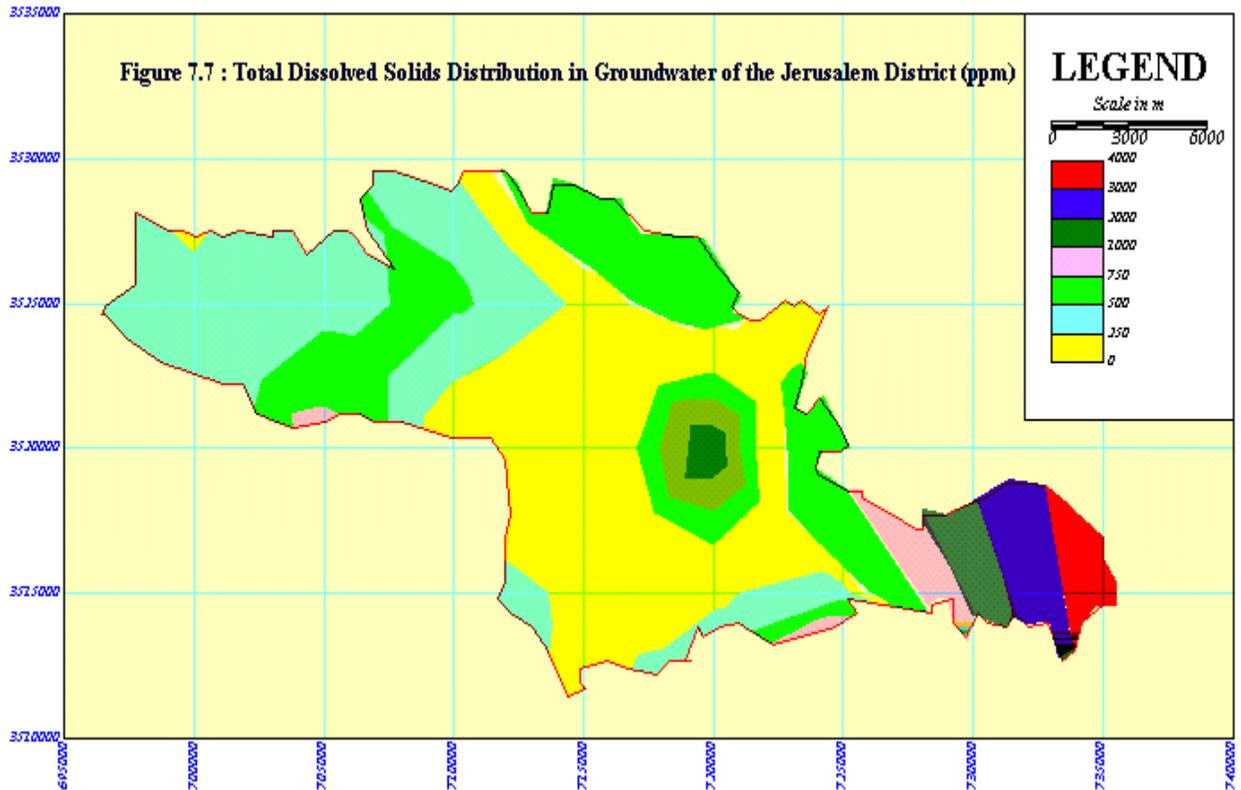
*Figure 7.4: Nitrate Distribution in the Groundwater Aquifers of the Jerusalem District.*



*Figure 7.5: Electro-Conductivity Distribution in the Groundwater Aquifers of the Jerusalem District.*



**Figure 7.6: Chloride Distribution in the Groundwater Aquifers of the Jerusalem District.**



*Figure 7.7: Total Dissolved Solids Distribution in the Groundwater Aquifers of the Jerusalem District.*

## Water Networks

Most populated parts of the Jerusalem District are connected to piped water systems. Some parts of the district, mainly the northern ones are supplied with water from the Jerusalem Water Undertaking (a private Palestinian water distribution company located in Ramallah).

Other parts, such as in East Jerusalem, are supplied by a network owned by the Israeli Jerusalem Municipality.

The Jerusalem Water Undertaking network reaches the towns and villages of Rafat, Kafr A'qab, Jaba', Er-Ram, Hizma, A'nata, Shua'fat, Beit Iksa, Nabi Samuwil, El-Jeib, Beit Duquq, Beit A'nan, Qatanna, Beit Surik, El-Qubeiba, Biddu, Beit Ijza, Bier Nabala, Judeira, and Beit Hanina ([Jerusalem Water Undertaking, 1991](#)). Water pricing for those areas connected with the Jerusalem Water Undertaking's networks ranges between US\$ 1

to US\$ 1.5 per m<sup>3</sup>, depending on the amount of water consumed. The other parts of the district, mainly East Jerusalem, are connected with the Jerusalem Municipality networks.

Unlike other civil services and infrastructure facilities, most parts of East Jerusalem enjoy a continuous supply of water through the existing water supply network. Before 1967, the Jordanians built a water network which continues today as the main backbone of the water network in the area. Since 1967, the Israeli Jerusalem municipality has connected to Jordanian-built network and added temporary new lines. The temporary lines in the Palestinian neighborhoods were laid over the ground and were supposed to be replaced by a new underground water network. Due to lack of approved town planning schemes, many parts of the temporary network are still in use, although it does not adequately meet the water needs.

Being aware of the needs, the Jerusalem municipality assessed the water supply situation and decided in 1984 to begin replacing the temporary network. As of mid 1995, a new network was laid in the Old City, Bab Al-Zahreh, Sheikh Jarah, and Shua'fat. Only less than 30% of the water network plan was carried out. The remaining part of the project is still undone.

Since 1988 and until recently, Shua'fat refugee camp suffers from lack of water supply as the Israeli military government ordered the disconnection of the camp from the water network due to disagreement over water costs (Arab Studies Society, Map Center, 1995; JMCC 1994). The Palestinian village of Al-Eizariya is also in dispute with the Jerusalem Municipality over water prices. As a result the village has suffered from frequent reduction in water supply by the Jerusalem Municipality as a collective punishment for the village.

## Chapter Eight Wastewater

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Wastewater is the spent water of a community, consisting of a complex mixture of mineral and organic matter as a result of different domestic and industrial uses. Proper disposal of wastewater is essential because of the potential diseases and pollution threats that the sewage carries. Therefore, methods of disposal, especially of industrial and domestic wastes, have to be properly controlled and managed. Proper disposal, however, requires investment in infrastructure such as sewerage systems and treatment plants. These vital infrastructure components are unfortunately lacking in most parts of the Jerusalem District which hinder and prevent control and management of sewage disposal process. Most of the flowing sewage is currently disposed of in valleys with no proper treatment or consideration of environmental guidelines. Wadi Al-Nar (Qidron Valley) and Wadi Al-Eyn are two major examples of an open field sewage dumping sites in the Jerusalem District.

### Domestic Wastewater

Domestic wastewater, by definition, is wastewater generated mainly from residential, commercial, and public facilities. Typically, small portions of the domestic wastewater, not exceeding 0.1%, are composed of impurities such as suspended, colloidal, and dissolved solids ([World Health Organization, 1987](#)) which makes it easy to treat and reuse. However, lab analysis of wastewater sample taken from Wadi Al-Nar showed high Biological Oxygen Demand (BOD) and chloride levels ([Gearheart, et al., 1994](#)). BOD and chloride in the Jerusalem wastewater were found to be as much as 660 and 1,080 ppm respectively, which are high when compared to other countries. Such levels indicate that impurities in the domestic wastewater are higher than the typical.

Microorganisms, mostly harmful bacteria and parasites, are also present in the sewage complex. Harmful gases such as hydrogen sulfide (H<sub>2</sub>S), methane (CH<sub>4</sub>), and ammonia (NH<sub>3</sub>) are released as well. In treating domestic wastewater, these harmful components should be eliminated in order to reduce pollution and spread of diseases.

The estimated quantity of domestic wastewater generated in the Jerusalem District is at least 12,202,960 CM per year. This figure is based on a yearly per capita water consumption of 35 CM, of which 80% ends up as wastewater, for the over than 0.43 million people living in the Jerusalem District. This figure is minimal as the per capita water consumption for the Israeli settler population (approximately 194,656 people) is known to exceed that of the Palestinian consumption rates by at least 7 times ([Issac, 1995](#)).

## **Industrial Wastewater**

The number of industrial facilities in the Jerusalem District which produce substantial amount of wastewater exceeds 70. Some of these facilities release wastewater containing chemical pollutants and heavy metals highly toxic and hazardous to the environment. The tanning industry, for example, releases wastewater containing chromium ions which are toxic and may pollute the groundwater. Cigarette and chemical industries also release similar pollutants to the environment. It is worth mentioning that there are 46 leather tanning and manufacturing factories, 1 Cigarette factory, and 2 chemical producing factories in the Jerusalem District ([PCBS, August 1995](#)).

Due to the tight closure of East Jerusalem area, ARIJ project team was only able to visit a few of the industrial facilities. Therefore, the information obtained were incomprehensive and could not lead to an acceptable estimation of the amount of wastewater generated from the industry in the Jerusalem District.

## **Wastewater Disposal Methods**

Large parts of the Jerusalem District lack sewerage networks therefore sewage is often disposed of in cesspits (an earthen cistern which collects disposed sewage). In several areas where sewerage networks exist, they are either not fully functional or cover a small percentage of the houses in a community. Sewage treatment plants do not exist in the district and most of the collected sewage is disposed of in open fields and valleys without any prior treatment.

In East Jerusalem, and according to the Jerusalem Municipality resources, until August 1994 there were only 15 km of sewerage network lines in East Jerusalem while the need reaches to more than 150.8 km. The new network lines planned for the year 1994 were only 7.2 km ([Arab Studies Society, Map Center, 1995](#)).

The only comprehensive activity to develop the sewerage networks in the Palestinian neighborhoods of East Jerusalem was in replacing the old Ottoman sewerage networks in the Muslim and Christian quarters of the Old City with a new network. This was necessary because of the importance of these two quarters to tourists. Outside the walls of the Old City, sewerage network maintenance and development was partial and sporadic and currently does not correspond to the increase in water consumption and size of the population.

According to PASSIA 1996, the current sewerage networks in East Jerusalem reach approximately 60% of the Palestinian houses, including the areas of El-Tur, I'sawiya, Sheikh Jarrah, Bab El Zahira, Beit Hanina, and Shua'fat refugee camp. However, our field work showed that major segments of the networks are not fully functional and cover partial areas. For example, the Shua'fat refugee camp sewerage system, which was constructed in 1977, suffers from leakage, especially during winter time.

At present, most of the East Jerusalem drainage, both runoff from rain water and sewage, is emptied into Wadi Al-Nar (Qidron valley), located south east of Jerusalem city. The sewage is dumped into the valley in an area outside the city limits, for sanitation considerations. The sewage flows down the valley to end in the Dead Sea. En route, some of the sewage percolates into the ground while the rest ends up in the Dead Sea ([Abells & Arbit, 1995](#)). Although the groundwater aquifer is at a deep depth in that location, prolonged percolation of the sewage into the soil may cause the pollution of the aquifer.

As mentioned earlier, treatment plants are not existing in East Jerusalem. The Israeli Jerusalem Municipality has no plans in the near future to construct sewage treatment plants to serve the East Jerusalem area. However, an international tender has been let for construction and operation of a new sewage treatment plant in the Israeli West Jerusalem (Sorek and Refaim), planned to be functioning by 1998 ([Abells & Arbit, 1995](#)).

Outside East Jerusalem, few areas enjoy the partial presence of sewerage networks, namely Bier Nabala (80% of houses), Qalandia refugee camp (10% of houses), A'nata (25% of houses) (Field work, 1996). The remaining communities in the Jerusalem District depend primarily on cesspits for the disposal of waste and gray water. Additionally, the waste water collected from Al-Bireh city and Al-Ama'ri refugee camp, north of Jerusalem District, presently flows into Wadi Al-Ein which empties into Wadi Soneit and Wadi Qilt inside the Jerusalem District ([Figure 4.3](#)).

Moreover, most Israeli settlements in the Jerusalem District lack infrastructure for sewage disposal. Sewage from these settlements flows down the fields and valleys and, in most cases, passes nearby or through Palestinian populated areas or agricultural land (Field work, 1995). Qatanna village is one example where sewage from the nearby kibbutz Ma'aleh Hameshah flows into the center of the village, forming lagoons near houses and village schools (Photo 8.1). The sewage flowing from Neve Ya'acov settlement also passes through Hizma village land and reaches the Ein Farrah spring, east of the village. Villagers reported that the sewage flow affects the spring water quality and prevents the villagers from utilizing it for any purpose.



*Photo 8.1: Sewage flow from Ma'aleh Hameshah Israeli settlement in Qatanna village lands, November 1996.*

### **Cesspits**

Cesspits are the most commonly used method for the disposal of wastewater in the Jerusalem District, especially in the communities located east and west of the district. Cesspits are used by all houses in Abu Dies, 'El-E'izariya, and Hizma, 75% of A'nata and El Qubeiba, and 90% of Qalandia refugee camp and Beit Duqqu. Also it is used by 20% of Bier Nabala houses. In East Jerusalem, nearly 40% of the houses depend on cesspits for sewage disposal.

Although using cesspits may be a relatively hygienic method for sewage disposal, this method leaves the main problem of sewage disposal unsolved. Cesspits are emptied regularly and their contents are dumped in open places and valleys without control or treatment. Field studies showed that wastewater is either disposed of in areas close to the entrance of the villages, as in Rafat, El Jeib, and Biddu, or in agricultural lands, as in Beit Surik, Beit Ijza, Beit Iksa. In these villages, several crops such as stone fruits and olives are irrigated by the wastewater evacuated from cesspits.

## **Environmental Impacts of Wastewater Systems**

The lack of an extensive sewage network and the absence of any sewage treatment plants in the district create a problem which requires a large budget and a long time to solve. The threat to human and wildlife posed by the uncontrolled dumping of sewage is however a serious problem that requires attention and immediate solution.

One of the major problems that clearly arises in the Jerusalem District is the sewage overflowing from cesspits and sewage networks. The absence of special storm water drainage systems in many communities leads to the flooding of the sewerage network, especially in wet winters. The flooding of cesspits is also another common problem, causing sewage to flow into the streets or neighboring land. These incidents are repeated in many villages, namely Biddu, El Jeib, Beit Ijza, Hizma, Kafr A'qab, El Judeira, Rafat, Beit Surik, Beit A'nana, Qalandia, and the unconnected part of A'nata.

Cesspit-flooding, in many cases, is due to many families using a common cesspit, as in Beit Iksa where an average of five families share one cesspit. As sewage is stored close to human habitats, sewage flooding is a major hazard to health and hygiene, and may lead to the spread of many diseases and infectious microbes within a community. Sewage may also reach the planted fields, thus contaminating crops and vegetables.

Pollution of ground water and water cisterns by sewage percolation is another main concern. In order to encourage absorption of sewage and lessen the frequency of emptying cesspits, many of the constructed cesspits are left with unsealed floors. Sewage may thus spread through the ground to reach nearby water cisterns or even springs. Due to this phenomenon, many water cisterns in the villages of Kafr A'qab, El Nabi Samuwil, Hizma, Beit Ijza, El Jeib, Beit A'nana, and A'nata are deserted or used for purposes other than domestic use. Percolation of sewage flowing in open fields and valleys is also a source of ground water pollution.

In conclusion, ARIJ recommends the adoption of the following measures in order to reduce the hazards brought by the current sewerage systems on the environment in the Jerusalem District:

1. To construct sewerage networks in additional villages and communities;
2. To replace the existing open sewerage canals and lines with closed pipes;
3. To install special storm water drainage systems, thus relieving existing sewerage networks from winter overloading and facilitate the treatment and reuse of such water;
4. To construct waste water treatment and reuse plants, particularly in Wadi Al-Nar area, and to encourage the population to use septic tanks or similar simple wastewater treatment methods;
5. To adopt legislation to enforce special codes for cesspits construction;
6. To prevent or control the use of raw sewage in agriculture;
7. To regularly test water cisterns and evaluate their adequacy for domestic or other uses; and

8. To launch environmental awareness programs to make people aware of the health and environmental problems brought by uncontrolled sewage dumping, and to advise them with precautionary practices and encourage their participation in the mitigation process.

## Chapter Nine Solid Wastes

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One of the major dilemmas in the Jerusalem District, and especially the East Jerusalem city is the management of solid wastes. In general, the solid waste services are not adequate from the initial stages of waste collection to the final stages of disposal. In addition, the increasing population, and changes in consumer habits have led to an appreciable increase in the quantity of solid wastes. However, due to the absence of data on solid waste quantities, or collection activities in many areas, especially outside East Jerusalem, planning and improvement of the current solid waste system have been difficult.

To date, there are no sanitary landfills in the Jerusalem District. The solid waste management in the Jerusalem District is mostly run by Palestinian local village councils, committees, local citizens, and the Jerusalem Municipality in East Jerusalem. The solid waste service in East Jerusalem suffers from negligence by the Israeli Jerusalem municipality. In the remaining parts of the district, the lack of funds and expertise are the two major obstacles in the improvement of the solid waste collection and disposal systems.

According to Oslo II agreement between the Palestinians and Israelis, civil services in the Palestinian villages in the district, excluding East Jerusalem, have been placed under the Palestinian supervision (Area B) ([Figure 1.3](#)). Improvement in solid waste collection and management is therefore expected. Several workshops have been done by the Palestinian authorities and institutions to discuss this issue and develop strategies and projects to improve the solid waste collection and disposal services. However, funding may still present a major obstacle.

Unless otherwise indicated, most of the information provided in this Chapter was obtained from field survey and personnel interviews with Palestinian village councils, committees, and citizens. In many areas, estimation has been used to produce information on quantities of solid waste generated, and recommended number of employees for efficient solid waste collection ([Al-Hamidi et al., 1995](#)).

### **Domestic Waste Collection and Disposal**

Solid waste collection and disposal in the Jerusalem district, as mentioned earlier, is managed by several bodies. In East Jerusalem, the Israeli Jerusalem Municipality supervises and manages solid waste disposal services to the Palestinians population and to the Israeli settler communities. Areas outside East Jerusalem are managed mainly by village councils, local committees and in a few areas by private small entrepreneurs.

The main solid waste disposal site serving the Jerusalem District, as well as Bethlehem District, is located on land near the Palestinian town of Abu Dies. The site, totaling 300

hectares, was confiscated by the Israeli government on September 2, 1988 and was unilaterally declared as state land (Cohen, 1993). The dumping area lies southeast of the town center and is almost a kilometer away from the closest Palestinian houses. The site is currently managed by the Israeli Jerusalem Municipality. Palestinian communities in the Bethlehem Districts are permitted to use the site in return for a service fee.

The dumping site near Abu Dies village, like other sites in the West Bank, has no adequate measures to prevent leaching of toxic wastes or pollution of groundwater. The site is also unguarded and has no fencing, thus allowing people and animals to enter the site, searching for food or recyclable material. This situation increases the chances of spreading disease, especially as medical wastes are dumped in this site without any treatment. What characterizes this site from others in the district is that the trash is covered daily with dirt by means of bulldozers, therefore reducing chances of open burning, litter or scavenging (Photo 9.1).



**[Photo 9.1: Trash dumping site near Abu Dies village, 1996.](#)**

Another dumping site that exists in East Jerusalem is located near Shua'fat lands, and also in open lands. The East Jerusalem trash trucks use any of these uncontrolled sites depending on the area of collection. The compiled data indicate that labor, equipment, and vehicles are not adequate to provide the appropriate services. The number of trash collecting staff in East Jerusalem areas is approximately 83 employee, while the number

of staff needed to properly serve the area should be 125 ([Arab Studies Society, Map Center, 1995](#)). Solid wastes are collected using plastic bags, containers of different capacities (75 Liters to >23 CM), compactor trucks, and container collection-vehicles. The total number of the equipment in use is much less than what is actually needed (Tables 9.1 and 9.2).

<b>Table 9.1: Labor and Equipment for Solid Waste Collection in East Jerusalem.</b>			
<b>Item</b>	<b>Current Number</b>	<b>Needed Number</b>	<b>Deficiency</b>
Labor	85.5	125.25	39.75
<b>Equipment</b>			
Plastic Bags	1,532,800	1,685,800	152,200
Containers 350 L	357	538	181
Containers 750 L	50	75	25
Containers 900 L	1,000	1,520	516
Containers 6 m <sup>3</sup>	25	42	17
Containers 23 m <sup>3</sup>	6	10	4
Compactor	1	2	1
Stations	3	5	2
<b>Vehicles</b>			
Sideroad Cleaning Vehicle	2	3	1
Tractor	6	9	3
Compactor Cars	6	9	3
Container Collecting Cars	1	1.5	0.5
<b>L: Litter CM: Cubic Meter.</b>			
<b>Source: Arab Studies Society, Map Center, 1995</b>			

**Table 9.2: Solid Waste Collection Data in East Jerusalem Palestinian Communities**

Neighborhood		Staff	Bags (in 1000)	Containers				
				350 L	900 L	6 m <sup>3</sup>	23 m <sup>3</sup>	>23 m <sup>3</sup>
<b>Beit Safafa &amp; Sharafat</b>	Current	7	42	125	70	3	0	1
	Needed	10.5	46.2	188	105	5	0	1.5
<b>Al-Thouri</b>	Current	4	20.4	14	40	0	0	1
	Needed	6	22.44	21	60	0	0	1.5
<b>Shua'fat</b>	Current	20	48	43	89	0	0	0
	Needed	29	52.5	62	114	0	0	0
<b>Beit Hanina</b>	Current	0	112	39	103	5	0	0
	Needed	0	123	59	155	8	0	0
<b>A'tarout</b>	Current	0	0	22	69	0	0	0
	Needed	0	0	33	104	0	0	0
<b>Kafr A'qab</b>	Current	0	0	12	181	0	0	0
	Needed	0	0	18	272	0	0	0
<b>Al-Tur</b>	Current	29	300	4	34	1	1	0
	Needed	41	330	6	51	2	2	0
<b>Wadi Al-Joz</b>	Current	0	6	4	28	3	0	0
	Needed	0	6.6	6	52	5	0	0
<b>Sheikh Jarah</b>	Current	0	0	3	31	1	0	0
	Needed	0	0	5	47	2	0	0
<b>Nablus Road</b>	Current	0	0	4	22	4	0	0
	Needed	0	0	6	33	6	0	0
<b>Bab Al-Sahera</b>	Current	0	0	14	52	5	1	0
	Needed	0	0	21	78	8	0	0
<b>Ras Al-Amoud</b>	Current	3	144	14	102	1	2	0
	Needed	5	158.4	21	163	2	3	0
<b>Swahera</b>	Current	0	163	0	17	0	0	0
	Needed	0	179.6	0	56	0	0	0
<b>Sur Bahir</b>	Current	0	195.6	45	71	0	0	0
	Needed	0	214.2	68	107	0	0	0
<b>Silwan</b>	Current	6	126	4	40	1	0	0
	Needed	6	138.6	6	75	2	0	0
<b>Al- I'sawya</b>	Current	1	117	10	25	1	0	0
	Needed	2	129.4	15	38	0	0	0
<b>Um Lesion</b>	Current	0	30	0	0	0	0	0

	Needed	0	33	0	0	0	0	0
<b>Islamic Quarter</b>	Current	22	32	0	0	1	3	0
	Needed	32	145.2	0	0	2	5	0
<b>Christian Quarter</b>	Current	0	91	0	0	1	0	0
	Needed	0	105.6	0	0	2	5	0
<b>L: Liter CM: Cubic Meter.</b>								
Source: <a href="#">Arab Studies Society, Map Center, 1995.</a>								

The solid waste from the rest of the Palestinian communities in the Jerusalem district is collected and disposed of by either village councils, local committees, private small entrepreneurs, or UNRWA in refugee camps. The official disposal sites used by these bodies are either owned or leased. Five regularly used dumping sites were identified through field work, and are located near Bier Nabala, Biddu, Beit Duqqu, and Beit A'nan, and A'nata ([Figure 6.1](#) and [Photo 9.2](#)). Many communities, however, dump trash at random places such as unused open fields ([Photo 9.3](#)).



**[Photo 9.2: Trash dumping site near Beit A'nan village, 1996.](#)**



***Photo 9.3: Uncontrolled trash dumping site near Oatanna village, 1996.***

Management of the dumping site, if carried out, is very minimal. Conditional with budget availability, some Palestinian local village councils may hire contractors to periodically spread the dumped waste and cover it with soil. However, the most common practice in most sites is to periodically burn the collected solid wastes in the open air. No special precautions are taken in this processing and handling of medical wastes from hospitals and clinics, or slaughterhouse wastes. Moreover dumping sites lack fencing or walls to prevent the public, especially children from scavenging trash for recyclable materials (from field survey). Individuals may catch several diseases from touching contaminated objects, especially medical wastes, while searching for usable materials.

Some of the local village councils and committees request service fees for trash collection. These fees are usually nominal, barely covering the actual expenses ([Al-Hamidi et al., 1995](#)). Several other Palestinian communities in the Jerusalem District, outside East Jerusalem, have no solid waste collection programs (Table 9.3). These communities usually dump their trash in open fields, in the backyards, or burn it on site.

**Table 9.3: Solid Waste Generated From Several Communities in the Districts and Methods of Disposal.**

#	District	Population	Quantity (Tons/day)	Annual Fee (JD)	Disposal Sites	Distance from Town (KM)
1	Abu Dies	7,339	6.61	--	Random	0
2	A'nata	3,173	2.85	30	PD in Shua'fat	2.0
3	Bier Nabala	1,745	1.57	45	LD	1.0
4	Beit Duqqu	1,090	0.98	21	LD	1.5
5	Beit A'nan	2,845	2.56	30	LD	3.
6	Beit Iksa	1,196	1.08	24	LD	20.0
7	Beit Surik	2,257	2.03	30	VL	--
8	Beit Ijza	404	0.36	0	Random	--
9	Biddu	3,586	3.23	15	LD	1.0
10	El Qubeiba	1,636	1.47	45	LD	2.0
11	El 'Eizariya	10,491	9.44	18	PD	4.0
12	El Jieb	2,660	2.39	--	Random	0
13	Essawahra	4000	3.6	--	Random	0
14	Hizma	3,290	2.96	--	Random	0
15	Jaba'	1,528	1.38	--	Random	0
16	Judeira	1,750	1.58	--	Random	0
17	Kafr A'qab	5,360	4.82	--	Random	0
18	Mukhmas	1,474	1.33	30	Wadi	30
19	Nabi Samuwil	171	0.15	--	Random	0
20	Qatanna	4,132	3.72	30	LD	0.10
21	Rafat	1,111	1.0	60	PD in Ramallah	5.0
	<b>TOTAL</b>	<b>61,238</b>	<b>55.11</b>			

**Notes:**

**VL = Vacant Land**

**CM = Cubic Meter**

**PD = Public Dump**

**JD = Jordanian Dinar**

- Bier Nabala and Beit Iksa share the same local disposal site located in Bier Nabala.
- Beit A'nan and El Qubeiba share the same local disposal site located in Beit A'nan.
- Waste generated has been estimated based on 0.9 kg of generated waste per capita per day
- Fees are annual and per household

The solid waste quantities generated by each community are estimated based on an average of 0.9 kg of waste produced daily by individual. Accordingly, the total quantity generated by Palestinians in the Jerusalem district, excluding East Jerusalem, is estimated at 79.7 tons/day, or 29,098.2 tons/year. These quantities are underestimated as they do not consider the larger accounts of industries, agriculture and medical wastes. The annual trash collecting fees for residential areas range from 0.0 to 60 Jordanian Dinar. The distance between collection centers and dump sites varies from a few meters to 20 km (field survey).

The large number of small and random trash dumps and the large amount of solid waste generated create difficulties for management and for abiding with the general ideas of safety. In general, small communities also have difficulty in recruiting trash collection crew as there is not enough work for a full-time and regular job.



*Photo 9.2 - Trash dumping site near Beit A'nan village, 1996*



**Photo 9.3 - Uncontrolled trash dumping site near Oatanna vilage, 1996**

In summary, solid waste collection and management in the Jerusalem Districts can be described as underdeveloped. The number of vehicles, labor, and collection containers can not keep up with the amount of solid waste generated ([Table 9.4](#)). The percentage of population served in the various communities ranges from 0% to 100%. Only approximately 46% of the Palestinian communities in the Jerusalem District receive waste collection services. A comparison between solid management in East Jerusalem and the remaining parts of the District (Tables 9.1 and 9.4) reflects the absence of actual solid waste management in most parts of the Jerusalem District.

**Table 9.4: Solid Waste Equipment and Labor for Jerusalem Districts, Excluding East Jerusalem**

#	District	Number of Vehicles	Number of Labors	suggested Number of Labors	Number of Containers	Community served %
1	Abu Dies	0	0	33	0	0
2	A'nata	1 AT	2	25	0	50
3	Bier Nabala*	1	3	10	80 (1CM)	100

4	Beit Duqqu	1 AT	2	3	0	80
5	Beit A'nan	1 AT	2	11	0	100
6	Beit Iksa*	1 T	3	5	24 (1CM)	60
7	Beit Surik	1 AT	2	8	0	40
8	Beit Ijza	0	0	2	0	0
9	Biddu	1 AT	2	13	0	100
10	El Qubeiba	1 AT	2	4	0	90
11	El 'Eizariya	2 T	7	30	66 (6CM)	100
12	El Jieb	0	0	78	0	0
13	Hizma	0	0	10	0	0
14	Jaba'	0	0	8	0	0
15	Judeira	0	0	4	0	0
16	Mukhmas	1 AT	3	8	0	100
17	Nabi Samuwil	0	0	1	0	0
18	Qatanna	1 AT	2	20	0	85
19	Rafat	1 AT	2	3	0	70

Source: From field survey, 1995-1996  
 \* = Bier Nabala and Beit Iksa use the Same Truck for collected solid waste.  
 CM = Cubic Meter.  
 AT = Agricultural Tractor.  
 T = Truck

Although information on some communities was not available or accessible, Table 9.4 above, gives a general picture of the trash collecting and management services in the Jerusalem District.

### Medical Waste

The amount of wastes generated from the various medical and health care facilities in the Jerusalem district is enormous compared to other districts in the West Bank. This is an indicator of the fact there is a large amount activity and number of patients treated in these facilities. However, disposal services for medical wastes are inadequate, comprising a serious threat to public safety.

Field survey of health facilities in the Jerusalem District, conducted by ARIJ project team, covered six out of the seven existing hospitals and seven private medical laboratories. Site inspection showed that all hospitals surveyed are located in residential areas while medical labs are in commercial areas. The location of these health care facilities, although convenient for patients, is certainly inappropriate considering the threat of contagious diseases generated from improper handling of medical wastes.

The quantity of medical waste generated from the surveyed health care facilities in the Jerusalem district is estimated at 130 tons/year (Field survey, 1996). The generated waste is classified as biological wastes (body organs, tissues, blood, urine, stools, etc.), sharp and pointed objects (needles, lancets, syringes, blades, saws, etc.), and contagious wastes (media culture, diapers, swabs, test tubes, cotton, surgical dressings, dialysis tubes, etc.). Despite this large quantity, currently no service exists, private or public, which is specialized in treating and disposing of medical waste. Medical waste treatment services exist in West Jerusalem, however they do not accept medical wastes generated from Palestinian hospitals in the district, except for radioactive wastes. Radioactive wastes, only generated by Maqassed Hospital, are sent to Hadassah Hospital facilities in West Jerusalem for treatment and disposal.

Although not all medical facilities were surveyed in the Jerusalem District, the information gathered on disposal methods of medical wastes are more or less representative of the remaining facilities. The disposal methods used for the various medical wastes are outlined in Table 9.5.

Therefore, the majority of medical wastes generated in the district are disposed of without prior treatment or proper handling. In almost one third of the medical facilities that were surveyed, proper precautions were not taken in handling sharp and pointed objects, thus increasing the infection risks for garbage collectors and children. Most of the medical centers used disinfectant (Detol) for cleaning bed sheets. Petri Dishes which are used for bacterial culture, are one of the few types of medical wastes that are treated before being disposed of. Surgery wastes, from general and maternity hospitals, are collected in plastic bags and disposed of in the municipal garbage.

Being mostly in the East Jerusalem area, the Palestinian medical facilities in the Jerusalem district are subjected to regular inspection by the Israeli Ministry of Health. Until recently, regular inspection of medical facilities was not practiced in the remaining districts of Palestine. Most hospitals in the District are inspected annually while the remaining few are inspected randomly and semi-annually. Several private medical centers and labs, however, are not inspected at all (Field work, 1996). In few hospitals, mainly Al-Maqassed, the administration carries out regular internal inspection of the various facilities to try to reduce the spread of diseases and achieve more healthy medical waste disposal methods.

In conclusion, the establishment of special medical waste treatment and disposal services is critically needed in the Jerusalem District. Once these services are made available, special legislation and laws should be founded to regulate medical waste handling and

disposal. Regular inspections should be carried out at all medical facilities, including those in the private sector. Educating the public through public awareness programs is also essential to reducing the spread of diseases from random medical waste disposal sites.

**Table 9.5: Methods of Disposal of Medical Wastes in the Jerusalem District**

<b>Methods of Disposal*</b>											
<b>Waste Type</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>Total</b>
<b>Blood samples</b>	53.8	7.7	23.1	0.0	7.7	0.0	0.0	0.0	7.7	0.0	100
<b>Blood tubes</b>	46.1	7.7	23.1	0.0	7.7	0.0	7.7	0.0	7.7	0.0	100
<b>Petri dishes</b>	25.0	8.3	25.0	0.0	16.7	0.0	16.7	0.0	8.3	0.0	100
<b>Urine</b>	66.7	0.0	8.3	16.7	0.0	0.0	0.0	0.0	0.0	8.3	100
<b>Pipette Tips</b>	61.5	15.4	7.7	7.7	7.7	0.0	0.0	0.0	0.0	0.0	100
<b>Cups</b>	69.2	15.4	7.7	7.7	0.0	0.0	0.0	0.0	0.0	0.0	100
<b>Test kits</b>	76.9	7.7	0.0	7.7	0.0	0.0	0.0	0.0	0.0	7.7	100
<b>Sticks</b>	61.5	15.4	7.7	7.7	7.7	0.0	0.0	0.0	0.0	0.0	100
<b>Swabs</b>	38.5	15.4	7.7	0.0	23.1	0.0	7.7	0.0	7.7	0.0	100
<b>Syringes &amp; needles</b>	38.4	7.7	15.4	0.0	0.0	0.0	30.8	0.0	7.7	0.0	100
<b>Lancet</b>	33.3	8.3	16.7	0.0	0.0	0.0	33.3	0.0	8.3	0.0	100
<b>Diapers</b>	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100
<b>Bed sheets</b>	25.0	0.0	0.0	0.0	50.0	25.0	0.0	0.0	0.0	0.0	100
<b>Beds</b>	66.7	0.0	0.0	0.0	0.0	33.0	0.0	0.0	0.0	0.0	100
<b>Infusion set</b>	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100
<b>Tubes</b>	60.0	0.0	0.0	0.0	20.0	20.0	0.0	0.0	0.0	0.0	100
<b>Quick cut</b>	66.7	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	100
<b>Urine bags</b>	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100
<b>Stool</b>	66.7	0.0	8.3	16.7	0.0	0.0	0.0	0.0	0.0	8.3	100
<b>Toilet paper</b>	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100

Numbers are in percent  
1 = Dumped in domestic trash containers without treatment  
2 = Burned then dumped in domestic trash containers  
3 = Autoclaving  
4 = Disposed off in the public sewerage  
5 = Sterilized by Alcohol, or Detol  
6 = re-used  
7 = Disposed off in special containers  
8 = Treated by special companies  
9 = Either 2 or 5  
10 = Either 1 or 5

## **Recommendations**

The environmental hazards resulting from improper management of solid waste may vary from the spread of epidemic diseases, contamination of surface and ground water supplies, to air pollution. Solid waste services need to be improved in the Jerusalem District. East Jerusalem, although better equipped than the remaining areas of the Jerusalem District in regard to solid waste management, needs improvement in services and increased budget for purchasing more equipment and hiring an adequate number of labors. All areas require sanitary disposal sites.

As central solid waste management programs are lacking in the district, a new strategy should be developed to tackle the problem from its initial stages of collection to the final stages of disposal. Topography, suitability of equipment, physical differences in solid wastes, collection sites, seasonal fluctuations, toxic wastes, quantities generated, and other factors should be assessed before developing such a strategy.

The practices presently applied for solid waste disposal in the Jerusalem District are environmentally unacceptable. Disposal sites need to be replaced with proper sanitary sites to prevent environmental pollution, and the spread of epidemic diseases. Industrial, agricultural, medical, and toxic wastes should be handled separately.

Public awareness and community participation can greatly influence and improve the collection service. Also, solid waste recycling should be assessed as a measure to reduce environmental pollution, save on natural resources, and generate profitable investment.

## Chapter Ten Air And Noise Pollution

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The state of the environment and quality of the atmosphere vary from one part of the Jerusalem District to another. This variation is brought by the difference in land use patterns and concentration of urban areas.

As mentioned earlier, and is apparent from [Fig 6.1](#), the population in the Jerusalem district is mostly concentrated in the East Jerusalem area. This part of the district houses over 320 thousand people and attracts many more people daily who come to work, shop, or visit. The number of cars that drive daily on the East Jerusalem roads is accordingly high, far exceeding 32,000 (accounting for at least 1 car per ten people). In addition, large numbers of vehicles belonging to foreign consulates, international NGOs, United Nations agencies, police and army, car rentals, and tourist busses move daily in this area. The number of cars registered in East and West Jerusalem reaches 110,612, that is approximately 1 car per 5.3 people ([Municipality of Jerusalem, et al., 1996](#)).

During most hours of the day, traffic jams became the norm in many of the East Jerusalem roads, which does not exceed a total of 180 km in length. The main roads, especially where traffic lights exist have turned into centers for emission of air pollutants. The streets of Sultan Sulieman and Salah Eddin are only two examples. As cars drive at low speed and with frequent stops, their emissions of carbon monoxide (CO) increase by at least 300% ([Watkins, 1991](#)). The East Jerusalem streets and traffic arrangement were not designed to handle the increasing number of cars, neither can the area of East Jerusalem handle the additional population. The signs of air pollution due to car emissions are very apparent on walls of building and monuments. The walls of the Notre Dame hotel building, which is located on Sultan Sulieman street near the New Gate, are but one example ([Photo 10.1](#)).



*Photo 10.1: Signs of air pollution from car emissions at the Notre Dame hotel's walls, 1996.*

Furthermore, most cars in East Jerusalem utilize leaded gasoline, except for a small percentage of new cars. Therefore it is expected that lead concentration in the air is high as well. Inhaled or digested lead may cause poisoning and disturbance in the gastrointestinal system, accompanied by pain, excessive tiredness, continued headaches, loss of appetite, nausea, and muscular pain ([Watkins, 1991](#)). In children, inhaled lead may cause brain damage.

Two major bus stations exist in East Jerusalem, both are located in commercial areas. These are a major source of noise and air pollutants, especially the station located at the eastern segment of Nablus road, close to Damascus Gate. Buss engines, which use only diesel as a source of energy, are left running most of the time while busses are waiting for passengers. Although diesel produces only traces of CO, its emission of sulfur (SO<sub>2</sub>) is roughly ten times higher than gasoline ([Watkins, 1991](#)). Moreover, as most busses in East Jerusalem are old and unmaintained, diesel engines with incomplete combustion produce large amount of pollutants when compared to gasoline ([Watkins, 1991](#)). The amount of pollutants released into the atmosphere at this location makes it hard for pedestrians to breath (Field work, 1996). What makes it more serious is that the station is located near Schmidt School for Girls where students are for extended periods exposed to harmful gasses and noise pollution.

Another area threatened with air pollution is located near Al-Ram, the Airport, and Bier Nabala, where the chemical factories of 'Atarot industrial settlement emit dust particles

and toxic gases into the atmosphere. Also stone quarries is located around this area, adding to the level of dust and particulate in the air ([Figure 6.1](#); [Photo 10.2](#)). Also, bad traffic at the military checkpoint near Al-Ram intersection further exacerbates this situation.



**[Photo 10.2: Air pollution from stone quarries near Jerusalem Airport, 1996.](#)**

No data or accurate measurements are currently available for car emissions or air pollutants in the Jerusalem District, or other districts in the West Bank. The only set of data was released by the Israeli Central Bureau of Statistics which lists pollutants' concentration in the Jerusalem's atmosphere (combined for East and West Jerusalem) (Table 10.1).

A study concerning ozone concentration in the Jerusalem area has also shown that the pollutants and precursors producing ozone comes from sources outside the area, mainly from Tel-Aviv ([Peleg, et al., 1994](#)).

**Table 10.1: Sources of Air Pollution in Jerusalem, 1994**

Type of Pollutant	Main Sources of Air Pollutant	Level of Air Pollution						
		24 hour			30 minute			
		Max. in Jerusalem		Israel Standard <sup>1</sup>	Max. in Jerusalem		Israel Standard	Units
		1993	1994		1993	1994		
<b>Sulfur dioxide (SO<sub>2</sub>)</b>	Fuel combustion	52	44	280	102	120	500	g/m <sup>3</sup>
<b>Nitrogen oxide (NO)</b>	Vehicles	91	136	560	378	334	940	g/m <sup>3</sup>
<b>Ozone (O<sub>3</sub>)</b>	Photo chemical Rxn between exhaust fumes and sun rays	52	151	160	281	167	230	g/m <sup>3</sup>
<b>Carbon monoxide (CO)</b>	Vehicles	5 <sup>2</sup>	3	11	8		60	mg/m <sup>3</sup>

Source: [Municipality of Jerusalem et al., 1996.](#)

1 = Maximum permitted level of pollution. According to standards adopted in 1992.

2 = Eight-hour value.

As of its importance, ARIJ is currently purchasing air monitoring equipment which will be used to assess threats to human life and sustainability of the Palestinian environment from the various air pollution sources. Such equipment will also be used to detect pollution focal points and transboundary air pollution where pollutants are generated in Israel and carried to the West Bank by wind action.

The eastern parts of the Jerusalem District have generally few concentrations of human activities, except for several Bedouin tribes, Israeli settlements, and military camps ([Figure 6.1](#)). Most of this part of the district is declared as either a closed military area, natural reserve, or state land. Therefore, Palestinians are not permitted to utilize this part of the district for agriculture or construction. Also the low precipitation falling on this part of the district converted it into a semi-desert where land cover exists only in few months of the year. The dominant source of pollution threatening this part of the Jerusalem District is therefore dust particles which are carried by wind.

The western part of the district is mostly agricultural or natural forested areas. Human concentration is restricted to villages, except for the Israeli industrial settlement of

Gev'on Hadasha, located east of Biddu village. The sources of pollution in this part are limited to burning trash near houses or in trash dumps. Air pollution is not yet a serious question.

In sum, cars are the main source of air pollution in the Jerusalem district, followed by dust and trash burning. Accordingly, the following actions are recommended:

- Monitor and impose regulations on permitted level of car emissions, cars not meeting these regulations should be stopped;
- Encourage the use of unleaded gasoline,
- Establish air quality monitoring system for East Jerusalem;
- Control burning of trash;
- Regulate the dust emission from quarries and close down dust producing establishments if dust reduction is not possible and harmful to nearby communities;
- Encourage the use of public transportation, and car pooling; and
- Reconstruct traffic and design efficient road networks to reduce traffic jams and eliminate bottlenecks.

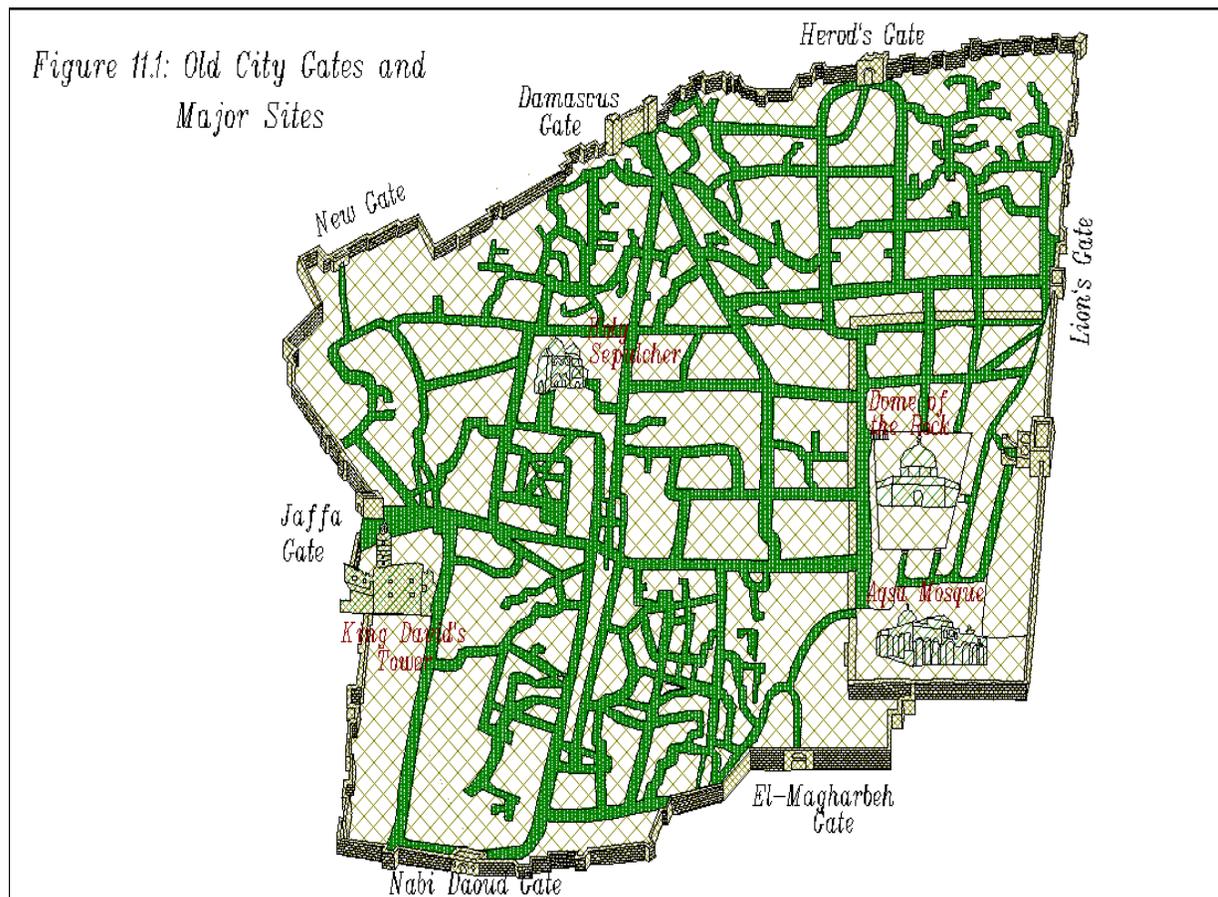
## Chapter Eleven Historical And Archaeological Sites

### The old city

The Old City, situated in the heart of East Jerusalem, was founded as early as 4000 BC. The first impression you get when entering the city is its Middle Eastern appearance and architecture, with its narrow crowded streets and unique bazaars.

The Old City is divided into four quarters, namely the Moslem, the Christian, the Jewish and the Armenian Quarter. The present walls surrounding the Old City were rebuilt by the Turkish Sultan Suleiman the Magnificent in the 16th century, with a circumference of approximately 4 km and an average height of 12 m ([UNECEP & Tamer, 1994](#)).

The walls surrounding the Old City open to the outside through eleven gates, of which four are currently sealed ([Figure 11.1](#)).



## Old City Open Gates

### 1- Damascus Gate

The name of this gate was given because it was the gate to the trade caravans heading to Damascus. It is also known by several other names such as *Triumphal Gate Way*, *The Gate of Pillar*, *Stephen's Gate*, and *Bab El-'Amoud*. The last is used by the Palestinians of today as the gate used to lead to a square with a Roman column located at its center.

The gate is the largest of all, with a width of about four and a half meters. It was built by the Ottomans at a location in the northern wall.

### 2- Herod's Gate

A very ancient gate located at the northern segment of the wall. The gate is claimed to be built during the Fatemiyeh period and later renovated by Sultan Salah Addin Al-Ayoubi. The gate was renovated for the second time in 1537 during the Ottoman period by the order of Sultan Sulieman Al-Qanouni. It is called by several names including *Bab El Sahera*, *Bab AlZouhour*, *Bab Armieyeh*, and *Bab Jub*.

### 3- Jaffa Gate

Is the second largest of all Gates after Damascus Gate and is located on the western segment of the wall. It is known in Arabic as *Bab El Khalil* as it leads to the road to Hebron (*Al-Khalil*). The gate was originally built by King Herod in 40 - 44 AD and was renovated in 1538 by the Ottoman Sultan Sulieman Al-Qanouni. In 1898, a new sub-[Figure 11.1](#): Old City's Gates and Historic Sites.

entrance was opened next to Jaffa Gate by the order of Sultan Abed Al-Hamid II to be used for the reception of the German Emperor who visited Jerusalem in that year.

### 4- El - Magharbeh Gate

A very ancient gate located on the southern segment of the wall. During the Ottoman period, the gate was kept closed except for delivery of water from Silwan Spring. It is known by many names including *Bab Silwan*, *Bab Al-Duman*, *Bab Ed Dabagha*, *Bab Al-Qumama*, and *Bab Al-Da'ieh*. The gate was renovated and enlarged by the Jordanians after it was severely damaged during the 1948 war.

#### 5- En - Nabi Daoud Gate

The gate is located on the southwestern segment of the wall. The inscriptions on the gate walls indicate that this wall was renovated in 1542 during the ruling of the Ottoman Sultan Sulieman Al-Qanouni. The gate is large and high compared to other gates. It is known by several other names including Zion Gate, *Bab Al-Mihrath*, and *Bab Harat Al-Yahoud*.

#### 6- Lions' Gate, or St. Stephen's Gate ( El-Asbat Gate )

It is located on the eastern segment of the wall, and nearest to the Aqsa mosque.

The gate was built by the Mamlouk Thaher Pepres and later renovated by the Ottoman Sultan Sulieman Al-Qanouni. It was called the Lions' Gate as two lion statues are fixed on top of the gate, representing the symbol of Thaher Pepres. Other names given to this gate include *Bab Sitna Maryam*, *Bab El 'Usoud*, *Bab St. Etan*, *Bab Benyamin*, and *Bab El Ghor*.

#### 7- New Gate

The New Gate is located on the northwestern segment of the wall and is the most recent of all gates. The New Gate, also known as Abed Al-Hamid Gate, was opened in the year 1887 by the order of the Ottomans Sultan Abed Al-Hamid II. The gate was closed after the 1948 Israeli-Arab war and was reopened in 1967 after Israel occupied the Old City of Jerusalem.

In addition to these seven gates, the Old City walls currently contain four sealed historic gates, namely the Golden Gate, El-Bab El-Wahed, Triangular Gate (El-Bab El-Muthallath), and El-Bab El-Muzdawage ([Al-Quds Newspaper, 1996](#)).

### **The Historical Buildings of the Old City**

The Old City of Jerusalem is one of the most holy sites for the three monotheistic religions. Currently it contains 31 churches, 17 mosques, and 7 synagogues (Appendix III). The following is a description of few of the important religious and historic sites in the Old City:

#### **Dome of the Rock**

A magnificent building which was built by Abed El-Malek Ibn Marwan in the year 692 AD, on the site from which the Prophet Mohammed rose to heaven in the heavenly journey "*Al Esra' wa Al Mi'rag* " ([UNECEF & Tamer, 1994](#)). The building itself has an octagonal shape with a very distinguished colorful tiling, gilded roof and golden dome ([Dowley & Hudson, 1992](#)). The Dome of the Rock (Cover Photo) is the third holiest site for Moslems after Al-Ka'ba in Mecca and Al-Masjed Al-Nabawi in Al-Madina.

## **Aqsa Mosque**

It was built by Al-Waleed Ibn Abed Al-Malik in the 8th century (709-715 AD) and was reconstructed by Al-Mansur the Abbassid after its destruction in 746 AD by an earthquake. The mosque is distinguished with its porch and seven arches ([OMAR & Vasko, no date](#)). It contains a museum and a library containing old copies of the Holy Qura'n.

## **The Western "Wailing Wall"**

It is part of wall surrounding the Aqsa Mosque area. It is claimed that this wall is all that remained from the Jewish second temple after its destruction. The wall is considered the most holy site for Jews ([OMAR & Vasko, no date](#)).

## **The Church of the Holy Sepulcher**

This church stands over the traditional site of the Golgotha, the place where Jesus was crucified, buried, and later resurrected. Therefore it is considered the most important church for Christians worldwide. It was first built in 325 AD by Helena, mother of Emperor Constantine, during her son's reign. It was later destroyed and rebuilt several times. Today, the basilica houses six Christian denominations ([OMAR & Vasko, no date](#)).

## **The Church of Gethsemane "The Church of All Nations"**

The construction of this church was completed in 1924. It is located on the traditional site where Jesus prayed, agonized before being betrayed and arrested. The church is distinguished by its interior ceiling which consists of twelve domes each containing beautiful mosaics ([OMAR & Vasko, no date](#)).

## **The Russian Church of St. Mary Magdalen**

It was built in 1888 by Czar Alexander III in memory of his mother the Empress Maria Alexandrona. It has a Russian Moscow style of architecture and is distinguished by seven golden onion - shaped cupolas ([OMAR & Vasko, no date](#)).

## Historical Sites in the Jerusalem District

### Al Isawiyyah

Located south east Jerusalem at 730 - 750 m above sea level. It was known that Al - Isawiyyah was built on the site of Laisha village which means the lioness. It is considered as an archaeological site which contains rock-cut water tanks, tombs, caves and a cistern.

### Et - Tur

An ancient Palestinian village located east of Jerusalem built at the top of Mount Olives. It is built at the site of the ancient village of Beth Phage, where Jesus began his "Palm Sunday" walk into Jerusalem. Most of the town is church or Islamic Waqf property. It has an ancient mosque in which Omar Ibn Al-Khatab, the Caliph, prayed when he visited Jerusalem. It also has the holy shrine of Sulieman Al-Faraisi ([Al-Dabbagh, 1991](#)).

### Arab Al - Sawahrah

An Arab village which has the following hamlets:

***Deir Macklak cave:*** contains ruins of a monastery, with mosaic floors, stone-carved water tanks and paintings.

***Khirbet El-Mintar:*** contains square-stoned structures, carved water tanks, and a cistern.

***Khirbet Jenjes:*** Located west of *Khirbet El - Mintar* and contains ruined walls and water tanks.

***Khirbet Kumran:*** 38 km east of Jerusalem and contains the ruins of an old Roman castle. It is famous for the ancient manuscripts of the Bible which were recently discovered in one of its caves.

***Khirbet Karm Abi Toq:*** Located west of *Khirbet Kamran* at 41 m above sea level. It may be the ruins of the old Cannanite village of Miedien.

***Khirbet Karm 'Etrad:*** Located east of *Khirbet Karam Abu Toq* and contains remains of an ancient cave and a rectangular building structure ([Al-Dabbagh, 1991](#)).

### Beit Duqqu

It is located north west of Jerusalem. The village has an ancient mosque, a water spring and a hamlet known as *Kirbet Ed-Weir* in its eastern part.

## **Hizma**

Situated north east of Jerusalem at approximately 600 meters above sea level. It is an archaeological site which contains ancient buildings, walls, caves, tombs, and columns made of granite. The following hamlets are found in its vicinity:

***Khirbet El-Khrabah:*** In the northern part of the village, also known as *Kirbet Attora*. It contains ruins and caves. To the east of this khirbet, we find Fara spring, *Khirbet Ein Fara*, and Mt. El Karnin.

***Kubur Bani Israel:*** Located in the northern part of Hizma, and has remains of ancient buildings.

***Khirbet Abi Muserah:*** West of Hizma and has ruined walls.

***Magharet El-jay:*** North of Ein Fara and contains several caves.

## **Mukhmas**

A Palestinian village located 10 km south-east of Jerusalem. It was built on the ruins of an ancient village known during the Roman period as Machmas. The found shards indicate inhabitation in the Iron Age, Roman and Byzantine periods. During the Roman period, Mukhmas was known for its superior wheat and was mentioned as a large village in Onomasticon of Eusebius. ([Al-Dabbagh, 1991](#)). The village is considered an archaeological site which has ancient mosaic-paved floor tombs. The following hamlets are found nearby:

***Tal Maryam:*** Located south west of Mukhmas, contains a cave and a rock-cut pool.

***Khirbet El-Hayi:*** Situated in the eastern part of Mukhmas, contains ruins of building basis, caves and water tanks.

***Khirbet Ed-Dawarah:*** *located* near *Khirbet El-Hay*, contains caves and ruined walls.

## **Qalandia**

A Palestinian village 8 km. north of Jerusalem which received thousands of Palestinian refugees after the 1948 Arab/Israeli war. Qalandia is a historical and archaeological site containing remains of ancient building structures, paved floor, a pool, rock-carved tombs, and a Byzantine bathhouse. A Roman villa has recently been excavated near the village.

## **El Jeib**

A Palestinian village northwest of Jerusalem located on the site of a great Canaanite city, Gibeon, where Joshua made the sun stand still. Gibeon which was first mentioned in the story of Joshua and Hivites (Joshua .9). "Excavations on the site discovered remains of

buildings, a winery, rock-cut pool 25 m deep with spiral staircase, tombs and pottery from the Middle Bronze Age I, Late Bronze Age and a massive city wall from the Iron Age I, in addition to a Crusader church ([IMD & Carta 1993](#)). There is also a large spring and five other deep-well springs.

### **Beir Nabala**

A Palestinian village located 8 km north of Jerusalem. It has remains of foundations of ancient buildings, wine presses and Arab style buildings from the Middle Ages ([IMD & Carta 1993](#)). Beir Nabala has several water springs and a deep well, which support the village's prosperous agriculture ([Al-Dabbagh, 1991](#)).

### **Beit A'nan**

The village is located northwest of Jerusalem and has a large spring. Four hamlets are in its vicinity, namely *Khirbet Al-Masaqa*, *Khirbet Al-Jabei'ah*, *Khirbet Rumaneh*, *Khirbet El-Khami*. In these hamlets there are remains of ancient building foundations, ruined walls, rock-carved water cisterns, stone-carved gate, mosaic floors, and an ancient presshouse ([Al-Dabbagh, 1991](#)).

### **'Anata**

Located northeast of Jerusalem at an average altitude of 670 meters above sea level. It is built on top of the Cannanite village of Anathoth, after the Cannanite God of War. It is also the traditional birthplace for Prophet Jeremiah. 'Anata has several archaeological sites containing remains of an ancient building structures with mosaic floors and pieces of columns. The following hamlets are found nearby :

***Khirbet Ka'kol:*** In the western parts of 'Anata, contains ruins of walls, rock-cut water cisterns and ancient tombs.

***Khirbet Deir As-Sad:*** Located in the eastern parts of Anata.

***Khirbet Almeet:*** Located northeast 'Anata, at an elevation of 638 m above sea level. It is located on top of the ancient Cannanite village of Ailamon and contains ruins of walls and rock-carved water tanks ([Al-Dabbagh, 1991](#)).

***Ein El-Fawwar:*** In northeastern part of 'Anata, contains remains of a pool, mosaics floor of an ancient church, water canal, and caves.

### **Shua'fat**

Located approximately 5 km north of Jerusalem, this city has been built on top of the Cannanite city of Dersophath ([Al-Dabbagh, 1991](#)). The following hamlets are found nearby:

***Khirbet Al-Sawma'a:*** In the northern part of Shua'fat, contains a stone built barn, remains of a rectangular building and stone-made tools.

***Khirbet Er-Ras:*** In the western part of Shua'fat, located at an elevation of 817m above sea level.

***Khirbet El-Masane':*** Southwest of Shua'fat, there remains a church partially carved in rocks, a cistern, and a rock-carved pool and tombs.

***Tal El - Foul:*** In the northern part of Shua'fat, has a partially excavated ancient city and a castle. It is located on top of the ancient Canaanite village of Gibeh.

***Khirbet El-Adaseh:*** To the north of *Tal El-Foul*, contains ruins of walls and rock-carved water tanks.

## **Beit Hanina**

Located approximately 8 km north of Jerusalem and has 5 small springs in the western parts of the town. Beit Hanina contains four hamlets, namely *Khirbet El-Byar*, *Khirbet Esh-Showmara*, *Khirbet Tlelia*, and *Kirbet Al-Hazoor*. These have ruins of a military camp, rock-carved water tanks and pools, ancient tombs, and a Roman road.

## **Kafr 'Aqab**

Located approximately 13 km north of Jerusalem and may have been built near the ancient Canaanite village of Ataroth. ([Al-Dabbagh, 1991](#)). The village has the following hamlets:

***Khirbet Attara:*** West of Kafr 'Aqab, has remains of ancient walls, tombs and a presshouse with mosaic floor. It is suspected that the Canaanite village of Ataroth was built at this location.

***Khirbet Kufr Tas:*** South of Kafr 'Aqab and has remains of ancient building structures.

## **Silwan**

A Palestinian village located a few hundred meters south of the Old City. From the fourth and until the seventh century, monks and worshipers considered this village a place for meditation and spiritual exercises. Rock-carved tombs and other ancient structures are found in Silwan. It is also famous for its five springs, collectively known as Ein Silwan. These springs are:

**1. Um Ad-Daraj Spring:** 300 m away from the eastern corner wall of the Aqsa Mosque. In ancient times, this spring was the sole supplier of water to Jerusalem. The spring is inside a cave 8 meters in depth. Visitors are required to descend 17 steps before reaching this natural cave.

**2. Silwan Pool:** Located a few meters away from Um Ad-Daraj. It was mentioned in the Book of John (9:7-11) during the time of Jesus and currently is used to irrigate small orchard areas.

**3. Attihtaneyyah Pool:** To the southeast of Silwan Pool, also known as the Red Pool.

**4. Jacob's Well:** Collects the water from Um Ad-Daraj, and in wet years, the water floods from the well and overflows to the neighboring fields. It was renovated by Sultan Salah Eddin Al-Ayyoubi.

**5. El - Lawza Spring:** Collects water flooding from Jacob's Well.

## **Sur Bahir and Um Tuba**

Located south of Jerusalem, and have several archeological sites and ruins. Um Tuba is built on the location where the Roman village of Metopa used to exist. There are several hamlets, including *Khirbet Sabha*, *Khirbet Um Lison*, *Khirbet Esh - Sheikh Sa'ad*, *Khirbet Deir El-A'moud*, *Jub Er - Roum*, *Khirbet El - Harthan*, and *Sheikh Ahmad Es-Sahouri*. These contain ancient water tanks, tombs with carved stones, caves, columns, and the ruins of building structures and walls.

## **Abu Deis**

Located east of Jerusalem on the site where the village of 'Beta Budison' existed at the Roman period. It has the 7 hamlets of *Khirbet Er Raghabin*, *Khirbet Abu Suwaneh*, *Khirbet El - Kharayeb*, *Khirbet Ez - Za'rora*, *Khirbet Abi Sa'd*, *Khirbet Abi Hwailan*, and *Khirbet Um El Jimal*. These hamlets contain quarter-shaped building foundations, rock-carved water cisterns, ruins of buildings, and caves.

## **Eizariya**

Located on the eastern part of the Mount of Olives and around 2 Km east of Jerusalem. It was known in the middle ages as Bethania St. Lazar as Lazarus, who was raised from death by Jesus, was buried in this village. Bethany has several monasteries and mosques and is considered an archaeological site containing ruins of a tower, tombs with mosaic floors, and ancient building structures. To the east of El - Eizariyeh, there is *Khirbet Al-Lemrasres* which contains a tower, ancient remains of a church and rock-cut water cisterns.

## **Jaba'**

Located northeast of Jerusalem at an elevation of approximately 665 m above sea level. It was known at the time of the Cannanites as Jabaa, which means the hill "*At-Tal*". It is considered as archaeological site, containing remains of an ancient village, rock-cut water cisterns, and ancient building structures of a tower.

## **Er-Ram**

A Palestinian village located approximately 7 km north of Jerusalem, off the Jerusalem-Ramallah road. During the Roman period, this town was known as Al-Ramah, and later known as Aram. It has remains of ancient buildings structures, cisterns, walls, and quarries ([IMD & Carta 1993](#); [Al-Dabbagh, 1991](#)). It has the hamlets of *Khirbet Erha*, *Khirbet Addasa*, *Khirbet Deir Sallam*, and *Khirbet Ras Et-Taweel*. These contain several archeological sites and remains such as cisterns, building foundations, walls, and rock-cut wine presses.

## **Nabi Samuwail (Samuel)**

Located northwest of Jerusalem on the top of a mountain 885 m above sea level. It is believed that the Cannanite village of Mispha used to exist at this site. It is also the traditional site where Prophet Samuel was buried. The Crusaders built a church at this village which later became the famous Nabi Samuwail Mosque ([Photo 11.1](#)). The village contains several archaeological sites including rock-cut cistern, building structures, and tombs.



*Photo 11.1: Nabi Samuwail (Samuel) Moseque, 1996.*

## **Rafat**

Located approximately 10 km northwest of Jerusalem at 800 m above sea level. It is believed that the Cannanite village of Yerfe'el existed at this site. Rafat is considered an archaeological site containing rock-cut tombs and remains of ancient building structures. Currently a large area of the village is owned by the Latin Patriarchate, where they have built a monastery there.

## **Beit Ikxa**

Located northwest of Jerusalem at approximately 760m above sea level. The village has 4 hamlets and contain several archeological remains of ancient building structures, walls, cisterns, caves, a tower, a tomb, and a pool.

## **Beit Surik**

Located northwest of Jerusalem, and was known in the middle ages as Bethsurit. It has the following hamlets:

***Khirbet El-Hosh:*** South of Beit Surik, contains ancient building structures.

***Khirbet El-Bawabah:*** West of Beit Surik, contains ruins of ancient buildings, a well, and old roads.

***Khirbet El-Jabal:*** Southeast of Beit Surik.

## **Biddu**

Located northwest of Jerusalem, there is an ancient mosque which was later renovated in 1934. The only hamlet found in Biddu is *Khirbet El-Nijim*, which is located in the north eastern part of the village and contains a rock-carved water cistern.

## **Qubeiba**

Located northwest of Jerusalem at an elevation of 770 m above sea level. It is believed that the ancient village of Emmaus existed at this site. Emmaus is the village at which Jesus appeared for two of his disciples after his resurrection (Luke 24:28-31). The village has a mosque and three monasteries. The largest of the monasteries belongs to the Franciscan Brothers where a church is built on top of the traditional houses of the two disciples. The monastery was built in the seventh century and renovated later in 1901.

Qubeiba has several archeological sites including the remains of a Crusader church. The hamlets of *Khirbet El-Kabbosh*, *Khirbet Kharabtani*, *Khirbet Al-Judeideh* are located in the areas around the village and contain ruins of walls, building structures, remains of an olive oil press, and a tunnel which crosses a nearby valley ([Al-Dabbagh, 1991](#)).

## **Qatanna**

Located northwest of Jerusalem where there is a large spring. Another spring of Ein Namous is located around 1.5 km away from the village. The following hamlets are found in the village's vicinity:

***Khirbet Beit Esh-Shabab:*** Northeast of the village, contains foundations of ancient buildings and remains of a rock-cut press house.

***Khirbet Baten El-'Arsh:*** Southwest of Qatanna, contains a cave.

***Khirbet Rafidia:*** South of the village, contains building foundations, a tower, cistern, a presshouse, and several caves.

***Khirbet Abi Lahm:*** North of Qatanna, contains ancient ruins.

***Khirbet El - Kaferah:*** Northeast of Qatanna, at an elevation of 774 m above sea level.

***Khirbet E-Kaferah*** was recently discovered in the southeast of the village

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# Appendix I

## United Nations Resolution 298 On Jerusalem

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The Security Council,

Recalling its resolutions 252 (1968) of 21 May 1968, and 267 (1969) of 3 July 1969, and the earlier General Assembly resolution 2253 (ES-V) and 2254 (ES-V) of 4 and 14 July 1967, concerning measures and actions by Israel designed to change the status of the Israeli-occupied section of Jerusalem,

Having considered the letter of the Permanent representative of Jordan on this situation in Jerusalem and the reports of the Security-General, and having heard the statements of the parties concerned in the question,

Recalling the principle that acquisition of territory by military conquest is inadmissible,

Noting with concern the non-compliance by Israel with the above mentioned resolutions,

Noting with concern also that since the adoption of the above mentioned resolutions Israel have taken further measures designed to change the status and character of the occupied section of Jerusalem;

1. Reaffirms its resolution 252 and 267 (1969);
2. Deplores the failure of Israel to respect the previous resolutions adopted by the United Nations concerning measures and actions by Israel purporting to affect the status of the City of Jerusalem;
3. Confirms in clearest possible terms that all legislative and administrative actions taken by Israel to change the status of the City of Jerusalem, including expropriation of land and properties, transfer of populations and legislation aimed at the incorporation of the occupied section, are totally invalid and cannot change the status;
4. Urgently calls upon Israel to rescind all previous measures and actions and to take no further steps in the occupied section of Jerusalem which may purport to change the status of the City, or which would prejudice the rights of the inhabitants and the interests of the international community, or a just and lasting peace;
5. Requests the Secretary-General, in consultation with the President of the Security Council and using such instrumentalities as he may choose, including a representative or a mission, to report to the Council as appropriate and in any event within 60 days on the implementation of the present resolution.

# Appendix II

## Health Institutions in Jerusalem<sup>(1)</sup>

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1. Augusta Victoria Hospital
2. St. John Ophthalmic Hospital (Sheikh Jarrah)
3. St. Joseph's Hospital (Sheikh Jarrah)
4. Jerusalem Hospital (Qalandia Refugee Camp)
5. Al- Maqassed Islamic Charitable Society
  1. Maqassed Hospital
  2. General Clinic
6. Red Crescent Society
  1. Maternity Hospital
  2. Clinic for Gynecology, Pediatrics
7. Dajani Maternity Hospital
8. The Jerusalem Maternity Home (Kafr 'Aqab)
9. UNRWA clinic (Al-Zaiyah/Old City)
10. Union of Medical Relief Committees Clinic, Beit Hanina
11. Hamilat Al-Tieb Orthodox Society for Relief of the Patient Clinic
12. Sayidat Al-Bishara Greek Catholic Church Clinic (Old City)
13. Roman Catholic Clinic (Beit Hanina)
14. Catholic Relief Services
  1. Rehabilitation and Physiotherapy Center (Al-Tur)
  2. Clinic (Ras Al- Amoud)
15. Islamic Awqaf
  1. General Clinic (Damascus Gate)
  2. Al-Aqsa Emergency Clinic
16. Al-Iman Clinic of the Islamic Sciences and Cultural Committee
17. Friends of the Sick Association Clinic
18. Social Reform Society Clinic
19. Health and Social Care Fund for Arab Workers Union Clinic (Old City)
20. Silwan Charitable Society Clinic
21. Silwan Sports Club Clinic
22. Al-Thouri Youth Club Clinic
23. Princess Basma Rehabilitation Center
24. El-Wyn El-Quds Special Education School for Disabled Children
25. The Swedish Organization for Individual Relief Rehabilitation Center (Sheikh Jarrah)
26. Terres des Hommes Rehabilitation Center (Sheikh Jarrah)
27. Al-Salam Center for the Blind (Shua'fat)
28. The Arab Association for the Blind (old City)
29. Kadamat Al-'Ata Society for the Elderly (Beit Hanina)
30. Al-Asadiq Al-Tayieb Society for Drug Rehabilitation

31. Family Planning and Protection Association
32. Kupat Holim (Israeli Sick Fund)
  1. Al-Sheikh Jarrah Center
  2. Damascus Gate Center
  3. Wadi Al-Joz Center
33. Jerusalem Municipality
  1. Al-Sheikh Jarrah Center for vaccination and health education
  2. Beit Hanina Center for vaccination services
  3. Al-Tur Center (general, open once weekly)
  4. Al-Amal School for Special Education for mentally disabled children
  5. Al-Nur School for Special Education for rehabilitation of moderately mentally disabled children
  6. Beit Hanina Rehabilitation Center of moderately mentally disabled adults
  7. Al-Hilal Drug Rehabilitation Center (Shua'fat)

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<sup>1</sup> Source: Mustafa Barghouthi & Ibrahim Daibes. **Infrastructure and Health Services in the West Bank - Guidelines for Health Care Planning**. Health Development Information Project (HDIP). Ramallah, 1993.

# Appendix III

## Rainfall in Jerusalem 1846 - 1993

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<b>YEAR</b>	<b>Rainfall (mm)</b>
1846/47	486
1847/48	420
1848/49	500
1849/50	NA
1850/51	701
1851/52	536
1852/53	363
1853/54	714
1854/55	553
1855/56	653
1856/57	810
1857/58	649
1858/59	532
1859/60	NA
1860/61	568
1861/62	635
1862/63	600
1863/64	534
1864/65	427
1865/66	496
1866/67	534
1867/68	702
1868/69	646
1869/70	324
1870/71	496
1871/72	479
1872/73	490
1873/74	1024
1874/75	690

<b>1875/76</b>	427
<b>1876/77</b>	360
<b>1877/78</b>	1112
<b>1878/79</b>	417
<b>1879/80</b>	610
<b>1880/81</b>	689
<b>1881/82</b>	610
<b>1882/83</b>	595
<b>1883/84</b>	733
<b>1884/85</b>	586
<b>1885/86</b>	651
<b>1886/87</b>	687
<b>1887/88</b>	448
<b>1888/89</b>	746
<b>1889/90</b>	534
<b>1890/91</b>	757
<b>1891/92</b>	659
<b>1892/93</b>	841
<b>1893/94</b>	643
<b>1894/95</b>	528
<b>1895/96</b>	786
<b>1896/97</b>	812
<b>1897/98</b>	NA
<b>1898/99</b>	536
<b>1899/00</b>	509
<b>1900/1</b>	346
<b>1901/2</b>	539
<b>1902/3</b>	691
<b>1903/4</b>	457
<b>1904/5</b>	370
<b>1905/6</b>	845
<b>1906/7</b>	450
<b>1907/8</b>	645
<b>1908/9</b>	580

<b>1909/10</b>	578
<b>1910/11</b>	792
<b>1911/12</b>	593
<b>1912/13</b>	533
<b>1913/14</b>	477
<b>1914/15</b>	498
<b>1915/16</b>	610
<b>1916/17</b>	508
<b>1917/18</b>	503
<b>1918/19</b>	367
<b>1919/20</b>	802
<b>1920/21</b>	594
<b>1921/22</b>	392
<b>1922/23</b>	385
<b>1923/24</b>	512
<b>1924/25</b>	260
<b>1925/26</b>	427
<b>1926/27</b>	510
<b>1927/28</b>	380
<b>1928/29</b>	553
<b>1929/30</b>	448
<b>1930/31</b>	319
<b>1931/32</b>	370
<b>1932/33</b>	250
<b>1933/34</b>	414
<b>1934/35</b>	541
<b>1935/36</b>	358
<b>1936/37</b>	686
<b>1937/38</b>	640
<b>1938/39</b>	664
<b>1939/40</b>	550
<b>1940/41</b>	660
<b>1941/42</b>	813
<b>1942/43</b>	762

<b>1943/44</b>	508
<b>1944/45</b>	838
<b>1945/46</b>	457
<b>1946/47</b>	279
<b>1947/48</b>	483
<b>1948/49</b>	508
<b>1949/50</b>	435
<b>1950/51</b>	219
<b>1951/52</b>	570
<b>1952/53</b>	521
<b>1953/54</b>	570
<b>1954/55</b>	335
<b>1955/56</b>	637
<b>1956/57</b>	689
<b>1957/58</b>	370
<b>1958/59</b>	440
<b>1959/60</b>	210
<b>1960/61</b>	489
<b>1961/62</b>	427
<b>1962/63</b>	232
<b>1963/64</b>	709
<b>1964/65</b>	638.8
<b>1965/66</b>	359.4
<b>1966/67</b>	753.1
<b>1967/68</b>	660.1
<b>1968/69</b>	575.4
<b>1969/70</b>	489.7
<b>1970/71</b>	589.7
<b>1971/72</b>	618.4
<b>1972/73</b>	453
<b>1973/74</b>	849.1
<b>1974/75</b>	498.4
<b>1975/76</b>	483
<b>1976/77</b>	568.4

<b>1977/78</b>	458.5
<b>1978/79</b>	426.7
<b>1979/80</b>	817.7
<b>1980/81</b>	553.5
<b>1981/82</b>	466
<b>1982/83</b>	868.3
<b>1983/84</b>	412.2
<b>1984/85</b>	523.2
<b>1985/86</b>	371.7
<b>1986/87</b>	677.2
<b>1987/88</b>	666.6
<b>1988/89</b>	472.1
<b>1989/90</b>	505.2
<b>1990/91</b>	392.5
<b>1991/92</b>	1134
<b>1992/93</b>	643.5

## Appendix IV

# Major Religious Institutes in and around the Old City of Jerusalem

Mosque	Church	Synagogue
Adhami Mosque	Alexander Nevski Church	Ha-Khurba Syngogue
Aqsa Mosque	Armenian Orthodox Monastery	Ha-Ramban Syngogue
Bab Al-Jadid Mosque	Armenian Patriarchate	Ha-Tupim Syngogue
Bani Ghunam Tower	Armenian Seminary	Kariate Syngogue
Bukharila Mosque	Casa Nova Monastery	Khabad Syngogue
E- Sheikh Reihan Mosque	Christ Church	Khasidei Braslav
El-Hamra Mosque	Church of Condemnation	Or Khayim Syngogue
El-Khanqa	Church of Our Lady of the Spasm	Porat Yousef Syngogue
El-Zahera Mosque	Church of St. George	Rabi Meir Ba'al ha Nes
Mad'ab Mosque	Church of St. John the Baptist	Tif'eret Yisra'el
Mustafa Mosque	Church of the Holy Sepulcher	Yokhanan Ben Zaki
Omar Mosque	Church of the Redeemer	Wailing Wall
Othman Mosque	Convent of Flagellation	
Qalawan Mosque	Coptic Patriarchate	
Qubat E-Sakhra	Crusader Church	
Sheikh Lulu Mosque	Custodia di Tera Santa	
Sidna Omar Mosque	E-Sultan Monastery	
Zawiat Bukharia Mosque	Ethiopian Patriarchate	

Mosque (name unavailable)	Greek Orthodox Church	
	Greek Orthodox Patriarchate	
	Greek Patriarchate	
	Latin Seminary & Patriarchate	
	Maronite Church	
	Maronite Monastery	
	Noter dame De France Monastery	
	Salesian Nunnery	
	Santa Mari Order	
	Sceurs de Sion Convent	
	St. Abraham Monastery	
	St. Anne Monastery	
	St. James church	
	St. Mark Church	
	St. Salvador	
	St. Veronika Church	

# Abu Ghnaim Environmental Impacts Assessment

*Dr. Jad Isaac, Roubina Bassous and Leonardo Hosh*  
[Applied Research Institute - Jerusalem \(ARIJ\)](#)  
*April 1996*

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Abu Ghnaim Mountain

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## **Introduction**

Abu Ghnaim area is located at the northern borders of the town of Beit Sahour in the Bethlehem district of the West Bank. It consists of Abu Ghnaim mountain (a man made forest); Abu Alsokhour mountain (a small hill to the east of Abu Ghnaim); and Khirbit Mazmoriah (a plane area lies between Beit Sahour and Umm Tuba). As being the only forested area, it is considered the oasis of the biological diversity in its region. Various types of flora and fauna depends on the Abu Ghnaim ecosystem where a unique microclimate is available. Abu Ghnaim area was particularly attractive to Israeli government, therefore, the area was included inside the borders of illegally expanded Jerusalem municipal boundaries in 1967. Today, the Israeli government is planning to build a huge Jewish settlement in the area of Abu Ghnaim. And so, we, the Palestinians living in the areas surrounding the mountain, demand to stop the development of this settlement on the land that is for us an important environmental, cultural, and historical site, as well as a heritage.

## **Background**

The slopes of Abu Ghnaim were planted with approximately 72,000 pine trees by the Jordanian and Israeli government between 1967 and 1972, as an application to the Jordanian Law of Plantation. Today, approximately 60,000 pine trees remain, as some trees were lost to cutting, burning, and pruning (Records of the Department of Agriculture).

## **Area**

The threatened Abu Ghnaim area is approximately 2126.75 dunams; and is located at an elevation ranging between 600-775 ([ARIJ GIS Unit, 1996](#)).

## **Soil Structure**

The area is dominated by Brown Rendzinas and Pal Rendzinas soil association. Soil structure is crumbly with a reddish to dark reddish brown color. The texture is loamy or clay, and about 30% is rocky ([ARIJ fieldwork, 1996](#)).

## **Climate**

*Rainfall:* The mean annual rainfall ranges between 600 and 700 mm.

*Temperature:* The annual average temperature ranges between 15 and 19 0c.

*Humidity:* Relative humidity is about 60% ([ARIJ GIS Unit, 1996](#))

## **Vegetation**

The major vegetation includes *Pinus halepensis*, *Pistacia lentiscus*, *Pistacia palaestina*, *Quercus ithaburensis*, *Ceratonia siliqua*, and *Ballotetalia undulatae* ([ARIJ Fieldwork, 1996](#)).

## Historical And Archeological Significance

The land in Abu Ghnaim mountain and the surrounding areas are historically owned by Palestinians from Beit Sahour and the village of Umm Tuba. After the 1967 war, in which Israel occupied the West Bank -- including east Jerusalem, and Gaza Strip. Abu Ghnaim mountain and the surrounding areas were cut out from the Bethlehem District and illegally annexed to the Jerusalem municipal borders in 1967.

Since the early centuries, various inhabitation existed in the pastoral area between Jerusalem and Bethlehem, known as the area of Abu Ghnaim. This area was itself the site of Byzantine Christian monastic activity. Abu Ghnaim is in the midst of an area intensively identified with the early Christians whose archeological remains have been under the Custodianship of the Franciscan Brothers since the middle ages.

Following is a brief list of the main historical sites identified in the Abu Ghnaim area ([Green, 1995](#)):

1. Cathisma (Bir Qadismu): Means "the place of sitting", located on the third milestone from Jerusalem to Bethlehem. The name refers to the belief that Mary dismounted precisely here before giving birth to Jesus. It was the site of an octagonal church and monastery said to have been built in the fifth century by a wealthy woman, who dedicated it to Saint Mary.
2. Khirbet Abu Ghnaim (St.Paul's Hill): Property of the Franciscans, who excavated it under V. Cordo in 1952. Near the village of Umm Tuba which in the Byzantine time was called Metopa. The site is also identified with the Monastery of Marinus named after Photinus in the fifth century.
3. Khirbet Luqa (Biyar Luqa; Umm Tuba): Excavated by V. Corbo for the Franciscans in 1954. Build by Marinus in Metopa, Byzantine Umm Tuba.
4. Bir El Qutt: A Georgian monastery of the sixth century dedicated to St. Theodore the Martyr. The Georgians had a long history in Palestine, though their churches eventually came under the Greek Orthodox Patriarch. Excavated by Corbo for the Franciscans in 1952-3.
5. Siyar El-Ghunam (Beit Sahour): Traditional site of the Shepherd's Field, east of Bethlehem. Excavated by C. Guarmani 1934. In 1951-2, V. Corbo cleared the entire complex on behalf of the Franciscans.

It is clear that this area, so suggestive of spiritual experimentation and so crucial to the history of early Christianity and the Byzantine church, must be preserved as a national park and a center of tourism and peace between Jerusalem and Bethlehem, the cities of holiness for Christians, Muslims, and Jews.

## Land Ownership

Historically, all tracts of land in the Abu Ghnaim area were inherited through local Palestinian families from Bethlehem, Beit Sahour, and Umm Tuba. During the 1930's, Jewish companies and Banks attempted to purchase land tracts in the area. Today, several Israeli Banks, companies, and individuals claim to hold documented tracts of land at the summit of both Abu Ghnaim and Abu Alsokhour mountains ([Jerusalem Municipality, 1995](#)).

## Chronology Of Events

1. After the 1967 war, the Israeli government formed a committee responsible for expanding the borders of Greater Jerusalem. As it was uninhabited and close to Jerusalem, Abu Ghnaim area was particularly attractive to the work of this committee. Therefore, the border drawn by the committee included all of the Abu Ghnaim area inside the borders of annexed 'United Jerusalem'.
2. For twenty years, alleged Jewish landowners, led by Mikor and Himnota companies, were planning to privately build a huge Jewish settlement in the area. They officially appealed to the government of Israel to expropriate all tracts of land at Abu Ghnaim area and asked the government to grant them the right to develop a settlement.
3. On June 6, 1991, the Israel Minister of Finance (Mr. Isaac Moda'ee) ordered the expropriation of the land tracts of Abu Ghnaim mountain. The expropriation order was based on the Lands Law of 1943 which authorizes the Minister to expropriate lands for Public use.
4. Landowners, Palestinian and Israeli, appealed to a special committee against the expropriation of their lands. While landowners were awaiting the decision of that committee, the expropriation procedure was finalized.
5. The Israeli government retreated from its previous agreement with Micor and Himnota companies to build a Jewish settlement on Abu Ghnaim, and initiated its own plans to develop the area and to build the planned Jewish settlement.
6. The new government attitudes pushed it into a legal conflict with Israeli landowners. The same company (Micor) who initiated the expropriation procedure, prepared counter plans to privately develop the same area and satisfy the needs of the Jewish public.
7. Based on the acts of the Minister of Finance and the counter plan, the Israeli Supreme Court of Justice issued a conditional verdict freezing the expropriation of the area, and ordered negotiations to start between Micor and the Israeli government.
8. By initiating direct negotiations and through offering large compensations, the Israeli government is trying to cancel the mentioned Supreme Court verdict. Both parties, the Israeli government and Micor company, are still engaged in a legal conflict in the Supreme court ([Jerusalem Municipality, 1995](#)).

9. After previously announcing the indefinite freezing of the Israeli settlement project on Abu Ghnaim in February 1996, the Israeli government currently decided to resume building the settlements.

## **Conditions Surrounding Abu Ghnaim Area**

### **Urbanization**

Abu Ghnaim area is surrounded by Palestinian towns and villages which are highly overcrowded. These surrounding conditions makes the existence of Abu Ghnaim green area very crucial, as it forms a micro-climate filter for the whole area that is suffering from a high rate of deforestation.

### **Deforestation**

Deforestation is a serious phenomena in the district of Bethlehem (including Beit Sahour and Umm Tuba). The lack of trees and the necessity of having green areas as that of Abu Ghnaim, pushed the Jordanian Government, who rarely got involved in such projects in the West Bank compared to the massive work they did in the East Bank, to plant this mountains ([Cohen, 1995](#)). Historically, most of the trees in the West Bank were uprooted by the Ottomans for the building of railways, and later by Israel for the building of settlements and settler roads. So, Abu Ghnaim area represents a forested area and an ecological reserve in an area characterized by a deteriorating environment and increasing desertification.

Most the developments that destroyed forests in and around Bethlehem District are the Israeli building of settlements in areas close to Abu Ghnaim, mainly Gilo, Har Gilo, and East Talpiyot. The Israeli developers are not concerned with replanting new trees near the destroyed ones nor do they have to protect the environment.

### **Landuse**

Studying Table (1), one can recognize the great importance of Abu Ghnaim area in relation to the classification of landuse in the surrounding areas.

Table 1: Landuse Classification of Bethlehem district

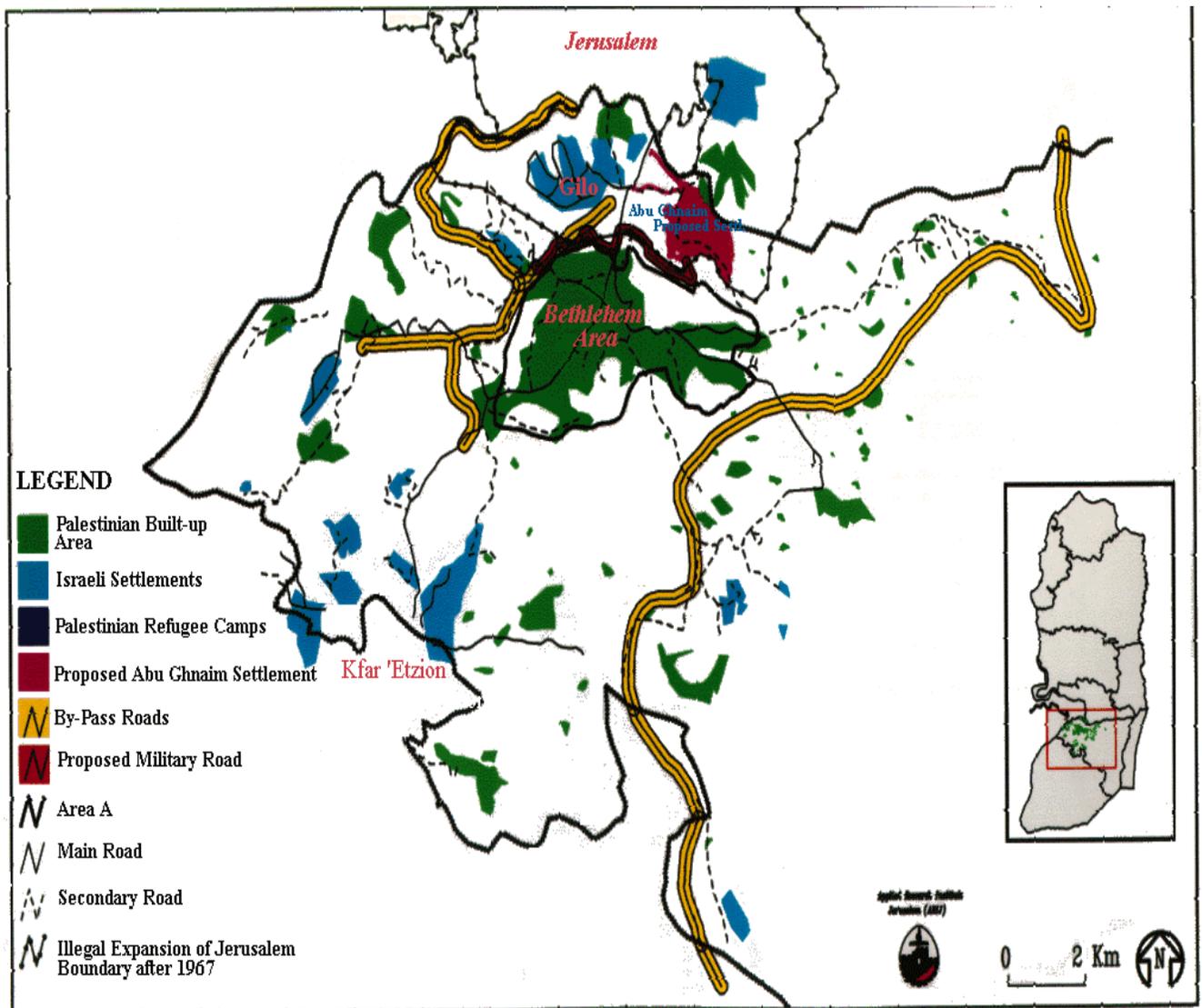
Landuse	Area (Dunams)	Percentage of land (%)
Palestinian Built-up Areas	20,000	3.5
Israeli Settlements	7,900	1.5
Closed Military Areas	310,000	54
Military Bases	4,00	<1
Nature Reserves	48,000	8.5
Forests	<3,800	<1
Cultivated Areas	43,000	7.5
Other	141,900	25
Total	575,000	100

Table Notes: "other" represent either unused land or land used for grazing, unofficial waste dumping and quarrying.

Source: ARIJ , 1995

The percentage of the green land is very small in comparison to other land uses. For example, the nature reserves, cultivated areas and forests are about 17%, whereas the closed military areas alone form are 54% of the total land. The lack of forests in the area makes the presence of green land very important. Abu Ghnaim area is one of these important areas that must be protected.

See also the Bethlehem district map which shows the new Israeli by-pass roads and Abu-Ghnain site location.



## The Consequences Of Deforestation Of Abu Ghnaim Mountain

Like all biodiversity 'hotspot areas', the degradation of Abu Ghnaim area will reach the point where it threatens the extinction of many organisms and, in the long-term, will deprive humankind of unique genetic resources. When forest degradation becomes serious, there may be little time to act to aid recovery as desertification happens quickly. If preventive action is not taken, the loss could well be total and permanent. Great caution is thus needed when mapping and assessing the degradation of forests. One must not lose sight of the fact that forests are dynamic systems, subject to a complex range of influences.

The major consequences of Abu Ghnaim settlement project are:

## Species loss

The rapid loss of the Abu Ghnaim forest will directly and indirectly endanger the survival of a large proportion of the area's wildlife. The unique presence of Abu Ghnaim forest area makes the uprooting of its trees a disaster to the biological diversity of fauna and flora. This area is considered the only refuge to the wild types of certain birds, mammals, and reptiles, listed in Tables (2; 3; 4; and 5).

Table 2: Some of the Major Birds Inhabiting or Passing Through the Area

English Name	Scientific Name	Type	Habitat
Chukar Partridge	<i>Alectoris chukar</i>	Resident	Rocky, forested land
Common Bulbul	<i>Pycnonotus xanthopygos</i>	Resident	Gardens
Common Swallow	<i>Hirundo rustica</i>	Resident	Cultivated area
Black Bird	<i>Turdus merula</i>	Resident	Forested land
Golden Oriole	<i>Oriolus oriolus</i>	Vagrant	Common in parks
Golden Eagle	<i>Aquila chrysaetos</i>	Resident	Mountainous areas
Gos Hawk	<i>Accipiter gentilis</i>	Passage Visitor	Coniferous forests
Lesser Throat	<i>Sylvia curruca</i>	Winter Migrant	Nature reserves
Little Owl	<i>Athene noctua</i>	Resident	Forested land
Mistle Thrush	<i>Trudus viscivorus</i>	Vagrant	Nature wood
Palm Dove	<i>Streptepelia senegalensis</i>	Resident	Pine trees
Raven	<i>Corax subcorax</i>	Resident	Common Mountains
Swift	<i>Apus apus</i>	Summer Visitor	Forested land
Syrian Wood Pecker	<i>Dendrecopos syriacus</i>	Resident	Forested land

Tawny Owl	<i>Strix aluco</i>	Resident	Forested land
Eagle Owl	<i>Bubo ascalaphus</i>	Resident	Coniferous forests
Robin Redbreast	<i>Erithacus rubecula</i>	Resident & Visitor	Coniferous forests
Source: ARIJ Fauna Database, and Field work, 1996			

Table 3: Some of the Major Mammals in the Area

<b>English Name</b>	<b>Scientific Name</b>	<b>Type</b>	<b>Habitat</b>
Bonden heimer's Pipistrelle	<i>Pipistrellus bodenheimeri</i>	Bats	Dense forests
Indian Crested Porcupine	<i>Hystrix indica indica</i>	Rodents	Forests, Rocky areas
Hare	<i>Lepus capensis syriaca</i>	Lagomorphs	Rocky mountains
Long-eared Bat	<i>Plecotus auritus</i>	Bats	Forests, Gardens
Common Noctule	<i>Nyctalus noctula</i>	Bats	Woodlands, Forests
Common Dormouse	<i>Eliamys quercines</i>	Rodents	Mountain forests
Forest Dormouse	<i>Drymysnitedela phrygies</i>	Rodents	Woodlands, Forests
Wild Cat	<i>Felis sylvestris</i>	Carnivores	Extensive forests
Wolf	<i>Canis lupus</i>	Carnivores	Mountains
European Hedghog	<i>Erinaccus europaeus concolor</i>	Hedghog	Rural forests
Wagner's Gerbil	<i>Gerbillus dasyurus</i>	Rodents	Extensive forests

Source: ARIJ Fauna Database, and Field work, 1996

Table 4: Some of the Major Reptiles in the Area

English Name	Scientific Name	Type	Habitat
Common Chameleon	Chamaeleo chamaeleon	Chamaeleo Forests	
Sheltopusik	Ophisaurus apodus	lizard	Grassy, forests

Source: ARIJ Fauna Database, and Field work, 1996

Table 5: Some of the Major Flora in this Area

English Name	Scientific Name	Value	Habitat
Anatolian Orchis	Orchis anatolica	Herbicious	Jerusalem Mountains
Cyclamen	Cyclamen persicaum	Nutritionalvalue	Palestinain Mountains (Protected species)
Salvia	Salvia fruticosa	Medical value	All over Palestine
Jerusalem Spurge	Euphorbia hierosolymitana	Scenic View	Jerusalem Mountains
Oleander	Nerium oleander	Economical value	Palestine
Red poppy	Papaver rhalas	Scenic view	Southern parts
Paronychia	Paronychia palestina	Medical value	Palestinain Mountains
Hyoscymus	Hyosecyamus aureus	Medical value	Mountainous areas
Thymus	Marjorana syriaca	Medical value	Mountainous areas
Chamomile Anthemis	Anthemis pseudocotula	Scenic view	Monutainous areas

Gundelia	Gundelia tournefortii	Nutritional value	Mountainous areas
* Add to these the vegetation mentioned on page(1).			
Source: ARIJ Flora Database, and Field work, 1996			

It is obvious from the these tables that Abu Ghnaim area is a habitat for many important species and a source of food chains and genetic diversity. Not only it is a habitat of beneficial plants and animals, but it is also an important station to migrating birds and animals passing through. Abu Ghnaim area is considered a scenic view consisting of unique natural attractions which is visible from most Bethlehem areas and the neighboring communities. The consequences of uprooting or disturbing such an important ecosystem of Abu Ghnaim will be disastrous on the many different species depending completely on this land.

Ironically, Israel's Environmental Laws are very much concerned with protecting forested areas similar to that of Abu Ghnaim. The 1962 Forest Ordinance states that ([Warchaiger, 1993](#)):

The following activities are forbidden in a forest-reserve without a permit:

- To remove forest products (logs, charcoal, sap, or resin, gutta percha, tree oils, weeds, vines, thatch, leaves, fruit, seeds, roots, bark, fibers, nests or any other material or parts of trees and plants; truff, soil, or minerals);
- To uproot or burn a tree; to remove its bark or damage it in any other way;
- To burn grass or to start any fire without taking adequate measures to ensure that it will not spread; the Minister of Agriculture may forbid the lighting of any fires in certain areas or during certain seasons. In addition, smoking is forbidden in a forest-reserve from the fifteenth of March until the sixteenth of November each year;
- To graze livestock or to allow them to enter a forest area;
- To dig up the earth;
- To build a dam or otherwise stop the flow of any river or stream; and
- To live in, or to build any building in a forest reserve.

## Protected Trees

The following are declared protected trees from 1976 until 1996 In the whole country:

Quercus	Cistus	Salix	Laurus nobilis	Arbutus
Pistacia	Cercis siliguastrum	Acacia	Ficus carica	Zizphus

Pinus	Styrax officinalis	Eucalyptus	Phoenix dactylifera	Grevillea robusta
Tamarix	Phillyrea media	Casuarina	Ficus sycomorus	Schinus molle
Salvia	Populus	Cupressus	Cadrus	

This law is very clear and should be applied to Abu Ghniam, especially the item concerning the protected trees, where Pinus trees is the main green cover for Abu Ghnaim. In this consideration, the Israeli Jerusalem Municipality in its Town Planning Schemes for East Jerusalem, designated Abu Ghnaim and its vicinity as "Green Area". Green Areas are areas left for parks and protection of nature.

## Climatic Change

Abu Ghnaim area with its planted Pinus trees is moderating the surrounding climate, reducing temperature fluctuation between day and night, maintaining humidity, reducing windspeed, and balancing atmospheric oxygen. The removal of such an extensive area of forest will reduce downwind rainfall by as much as 20% in a place which needs every single drop of water for survival. Also, forests generally reduce heat from the warming of the sun through evapotranspiration than do bare soil or grassland, so the destruction of this forest could alter the heat flux in the area (for example, the change in the surface temperature will be between 0.5 °C and 5.5 °C) ([Barrow, 1991](#)).

There is a clear relationship between rising global CO<sub>2</sub> levels and deforestation, particularly in the case of Abu Ghnaim area and its relation to its surrounding. Mature forests act as a sink for excess CO<sub>2</sub>, converting CO<sub>2</sub> to oxygen. The destruction of this forest would cause a reduction in the CO<sub>2</sub> fixation that is done by its vegetation. The increase of the CO<sub>2</sub> level would have an impact on the local and global environment and its terrestrial biota.

Trees in general are the best tool for purifying and cleaning the atmosphere. Pinus trees filters dust and pollutants from the air. Studies done in California show that Pinus trees fix relatively high amount of CO<sub>2</sub> gas. One thousand Pinus trees can remove 800 Kg of CO<sub>2</sub> gas/year ([Surkel et al., 1990](#)). The 60,000 Pinus trees in Abu Ghnaim area fix 48,000 Kg of CO<sub>2</sub>/year, removing a significant amount of pollutants generating from the social, physical, and chemical actions in the cities surrounding the mountain. Therefore, the presence of Pinus tree is very important to sustaining human survival in this area.

## **Impacts on soil erosion and hydrology**

Root systems play an important role in protecting and enhancing both the physical and chemical properties of soil. Root systems provide beneficial soil properties such as:

- Soil aeration.
- Soil particles porosity.
- Enriching the organic matters.
- Soil improvement through breaking down soil parent materials to fertile soil.
- Preventing soil erosion.
- Nitrogen fixation.
- Increasing water holding capacity or increase soil water availability.

Serious deforestation can lead to increased erosion and downslope flooding, an environmental loss to healthy land.

## **Health impacts**

A number of diseases can afflict humans or livestock in the neighboring areas where vegetation cover is altered. For example, altering vegetation may favor trypanosomiasis transmission through flies. Also, human breathing may be impacted by greater levels of dust pollution and CO<sub>2</sub>, higher heat, less rain and increased wind. This, in turn, form a growing public health due to resulted complex environmental reasons.

## **Economic impacts**

The loss of forests or woodlands brings great economic loss. Species may become extinct without their potential value being appraised; genetic resources are lost; loss of grass species and native herbs; and timber may be wasted. The value of forests is difficult to assess economically, and its economic costs could far exceeds any gain from cleared agricultural land, sales of timber, etc. In this specific case, it is clear that the loss of habitat would far exceed the economic benefits of building the Israeli settlements.

## **Tourism impact**

By degrading this forest, the scenic value of the region will decline, this negligence leads to a decrease in the rate of tourism activity, and so to the decrease in country incomes. In a country such as Palestine, tourism provides support in different fields such as: hotel

management, wood carving, recreation resort, etc. Tourism funds can be used for environmental management and to bolster marginal land agriculture.

Also, the closeness of Abu Ghnaim to the Christian traditional sites especially the site of Shepherd's fields adds to the holiness of the wilderness setting. The removal of the trees and replacing them with modern houses and industrial parks will definitely destroy this holy image and greatly damage the holiness of the site. Moreover, Abu Ghnaim itself is considered the Shepherds' fields for some denominations, including the Mormon's. Such action will also create an undesired environmental impact and destroy a panorama which all people living in the area surrounding to the mountain (Bethlehem, Beit Sahour, and Umm Tuba) are very proud of.

### The Governmental Plan

The government is planning to build a settlement on Abu Ghnaim mountain. The development will be on two stages:

- Stage 1: To build 4,500 housing units in high-rise structure, with all the required infrastructure (such as: roads, hotels, schools, market-places), on the 1851 Dunams expropriated (the land includes all the high lands and slopes of Abu Ghnaim and Abu-Alsokhour mountains).
- Stage 2: To build a similar number of housing units on Khirbit Mazmouriah, a plane land to the east of Abu Ghnaim and Abu Alsokhour mountains. Khirbit Mazmouriah is totally owned by Palestinians from Beit Sahour and is not yet expropriated. The plans might also include the construction of a huge central prison. Overall, the new settlement is expected to be able to accommodate thirty to forty thousands Jewish settlers.

This plan appears clear in the Map of Abu Ghnaim area ([Municipality of Jerusalem, 1995](#)).

*Table 6: Mount Abu Ghnaim Settlement Landuse*

Landuse	Area in percentage (%)	Area in Duram
Industrial zone	3.44%	71.6
Forest area	16.75%	356.4
Roads	13.12%	277.6
Side road trees(Panorama)	4.84%	103.4
Public institutions	3.31%	70.6

Built-up area	37.50%	797.6
Gardens	4.95%	106
Public buildings	11.01%	234.2
Hotels and tourist village	1.35%	29
Private commercial zone	2.63%	56.2
Monuments	0.63%	13.65
Christian religious site	0.47%	10.5
Total	100%	2,126.75

### **The Consequences Of The Settlement Building**

In addition to the previously mentioned important consequences, other issues of concern should be stated here. Conclusions can easily be drawn by comparing the building of settlement to the green land of Abu Ghnaim area. It is obvious that the forested area will not exceed 16.75% of the total, the rest of the land will be used for housing, commercial, and industrial activity. All these activities will increase the environmental degradation in an area that used to have clean microclimatic condition. The establishment of a new settlement will be a source of pollution such as noise, radiation, gases, dust, garbage, wastewater, air pollution, ... etc. These impacts can not be ignored and should be taken into consideration by the Israeli planners and environmentalists.

### **Industrial wastes**

Industry produces particularly toxic airborne pollutants such as copper, mercury or nickel. Consequently, extensive areas may suffer vegetation and soil damage. Also, a number of mineral processing and industrial activities cause sufficient pollution to drive down the value of nearby land, for example: heavy metals, toxic compounds, radioactivity pollution ([Barrow, 1991](#)).

### **Domestic wastes**

It is planned that 37% of the proposed settlement land will be built-up, including approximately 9,000 housing units, in which over 30,000 Israeli settlers will live. The collection and disposal of domestic waste and sewage can cause many environmental problems, especially high levels of heavy metals contamination to the air and

groundwater. This problem can expand, if the industrial impurities are mixed with domestic sewage residues ([Barrow, 1991](#)). It is expected, similar to most established Israeli settlements in the West Bank and Gaza Strip, that the generated sewage from this proposed settlements will be left to run in the open fields and valleys, thus creating great damage to the agriculture in the area and becoming a source of diseases.

## **Acid deposition**

Acidification will increase especially when commercial, public institutions, industrial zones, and monuments will be replacing the forested area of Abu Ghnaim. The increase of acidity can lead to the damage of all types of sensitive living organisms including plants and animals; and will alter the soil characteristics. The CO<sub>2</sub> concentration will increase as the forested area will not exceed 16%. CO<sub>2</sub> reacts with rain in the atmosphere to form weak carbonic acids that contaminate the rain and makes it slightly acidic ([Barrow, 1991](#)).

It is obvious now that pollutants can be deposited much more once the settlement is established, particularly in comparison with the forestry lands existing now. If action is not taken, the loss will be total and permanent. So great caution is needed in mapping and assessing the degradation of this crucial area.

## **Conclusion**

It is to our surprise that such a large project as Abu Ghnaim settlement, which will clearly bring devastating effect on the area and its vicinity, was approved by the Israeli Government without requesting or considering environmental impacts assessment. In fact, the protection and conservation of the environment were core items in the latest Oslo B agreement between the Israelis and the Palestinians, in which both parties are obliged to abide with.

This new settlement will severely alter the environment of the area by removing the benefits the forest now provides and bringing domestic and industrial pollution. The loss of genetic diversity and the rare habitat that the Abu Ghniam area provides is a serious degradation and loss for plants, animals, and human life. This forest area must not be disturbed in order to protect the tentative balance of nature and society.

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E-Mail: [envir@arij.pl.org](mailto:envir@arij.pl.org)