Deanship of Graduate Studies
Al - Quds University

Managing Water Service in Jenin Governorate: Current Status and Recommended Solutions

Muneer Hussien Mohammed Mostafa

Msc. Thesis

Jerusalem-Palestine

1427 (Hijri) / 2007 (common)

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Managing Water Service in Jenin Governorate: Current Status and solutions

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Jerusalem Palestine

1247(Hijri)/2007

Dedication

To

The soul of my father and mother

To

My sons and daughters

To

My wife

Muneer Hussien Mohammad Mostafa

Declaration

I certify that the thesis submitted for the degree of Master is the result of my own research, except where otherwise acknowledged, and that this thesis (or any part of the same) has not been submitted for a higher degree to any other university or institution

Signature:…….

Muneer Hussien Mohammad Mostafa

Date:……

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Muneer Hussien Mohammad Mostafa

Definitions

The list of terms given below is common to ISO/CD 24510, 24511 and 24512.

Affordability	:	Ability to be economically bearable by the users**.** Note The affordability may be estimated through the level of prevailing charges for water services in relation to the available income of targeted social groups of consumers
Asset	:	Capital good used for the provision of the service. Note Assets may be tangible or intangible.
Asset management	:	the processes that enable a water utility to optimize the cost of providing, maintaining and disposing of infrastructure assets for specified performances
Availability	:	Extent to which a water utility's infrastructure asset, resources and employees enable effective provision of services to user as specified**.**
Community	:	One or more natural or legal persons and, in accordance with national legislation or practice, their associations, organizations or groups, having interests in the area where the service is provided**.**
Connection	:	Service connection set of physical components ensuring the link between a point of delivery and the water main
Coverage	:	Extent to which a water utility's assets allow services to users.
Customer	:	User who has a direct or indirect relation by means of a service agreement with the water utility.
Drinking water system	:	Infrastructures necessary for supplying drinking water
Drinking water	:	Water intended for human consumption
Effectiveness	:	extent to which planned activities are realized and planned results achieved
Efficiency	:	Relationship between the result achieved and the resources used
Environment	:	Surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation**.**
Infrastructure	:	System of tangible fixed assets needed for the operation of a water utility.

Intangible assets	:	Software, databases. Note contrary to consumables, assets may be depreciated in accounting systems.
Interruption	:	Situation where the service is not available. Note interruptions may be planned or unplanned.
Maintenance	:	Set of activities aimed at keeping or restoring an asset in order to perform required functions in specified conditions. Note maintenance is a combination of technical, administrative and managerial activities.
Management	:	coordinated activities to direct and control an organization
Management system	:	System to establish policy and objectives and to achieve those objectives. A management system of a drinking water utilities can include different management systems, such as a quality management system, a financial management system or an environmental management system.
Operator	:	Person or organization, which performs day-to-day activities necessary for the provision of the service. There may be one or several operators for a given service. For example, distinct operators for installations operation, billing and recovering service. The operator may be legally distinct or not from the responsible body.
Point of delivery	:	Point of entry physical fixed interface beyond which the utility is not legally responsible. Example a connection box, a meter, the limit between public and private property. The point of delivery is generally defined in the service agreement.
Registered customer	:	Customer for whom relevant information is recorded by the responsible body or operator
Rehabilitation	:	Operation on an infrastructure restoring its initial level of performance
Repair	:	Action on a non-conforming product, equipment or facility to make it acceptable for the intended use. Repair may be planned (preventive maintenance) or due to emergency.
Responsible body	:	Body which has the overall legal responsibility for providing drinking water and/or wastewater services and for establishing the policy and the general organization of the relevant water utility for a given geographic area. Example A regional or local government, a city, a public agency, a private company. The responsible body can be public or private. The responsible body may operate directly the system with its own means or entrust a contractor.

Restriction	:	Situation where the service does not meet the availability conditions specified in the service agreement**.**
Service agreement	:	Establishment of an accord between the registered customer and the water utility on the conditions of service provisions
Stakeholder	:	Person or group or organization having an interest in the performance or success of an organization. Examples users and building owners, responsible body, operator, employees of the operator, external product suppliers and providers of other services, contractors, communities, consumers and environmentalist associations, relevant authorities, financial institutions
Tangibles assets	:	Buildings, pipes, wells, tanks, treatment plants, equipments, hardware
User	:	User person, group or organization, that benefits from drinking water delivery end
Wastewater	:	Water affected by human activities and storm waters, discharged to the environment or sewer
Wastewater system	:	Infrastructures necessary for collecting and treating wastewater
Water utilities	:	The overall processes, activities and means necessary for supplying drinking water or collecting and treating wastewater and providing the associated services**.** The following Glossary of words which is taken from International Benchmarking Network for Water and Sanitation Utilities(IBNET) are necessary to understand Benchmarking and performance indicators for water utilities:
Accountability	:	Obligation to demonstrate that work has been conducted in compliance with agreed rules and standards
Accuracy	:	Degree of conformity of an indicator to a true value given the data quality and resources; Precision is the degree that further calculations will show the same or similar results. The results of the indicator calculation can be accurate but not precise, precise but not accurate, neither, or both; if a result is both accurate and precise, it is called valid (See Quality assurance).
Aggregation	:	The process of the calculation of national or regional performance indicators on the basis of data and indicators from a set of individual utilities

Benchmark	:	Reference point or standard against which progress or achievements may be compared, e.g., what has been achieved in the past, what other utilities are achieving, what was targeted, what could reasonably have been achieved in the circumstances. An intermediate target to measure progress in a given period.
Benchmarking	:	The study and analysis of the performance of a utility or a group of utilities in order to improve one's own performance.
Benchmarking, metric	:	The quantitative measurement of performance against other utilities over time, using Key Performance Indicators, such as that exists in the IBNET Toolkit.
Benchmarking, process	:	The analysis of the utility's business processes while comparing the utilities' performance with that of utilities that are considered to perform exemplary in implementing these business processes.
Best practice	:	Best practice data are used to demonstrate what works and what does not and to accumulate and apply knowledge about how and why they work in different situations and contexts.
Census	:	A census is the process of obtaining information about every member of a population (not necessarily human population). It can be contrasted with sampling in which information is only obtained from a subset of a population of utilities.
Data collection	:	The process of gathering information to enable the calculation of indicators.
Data collection tools	:	Methodologies used to identify information sources and collect information during benchmarking assessment
Data	:	Specific quantitative or qualitative information or facts that are collected
Effectiveness	:	The extent of which the development objectives were achieved, taking into the account their relative importance.
Efficiency	:	A measure of how economically resources/inputs (funds, expertise, time) are converted to results.
Indicator	:	Quantitative or qualitative factor or variable that provides simple and reliable means to measure achievement, to reflect the changes connected to an intervention, or to help assess the performance of a utility.
KPI (Key performance indicators)	:	Most important parameters of utility performance that give an indication how well the process, or utility is operating.

Monitoring	:	A continuing function that uses systematic collection of data on specified indicators to provide the main stakeholders with indications of the extent of progress and achievements of objectives and progress in the use of allocated funds.
Performance gap	:	The shortfall in performance of a utility in comparing that utility with the "best practice" utilities
Performance indicator	:	A variable that allows the verification of changes in the performance of the utility or shows results relative to what was planned.
Performance measurement	:	A system of assessing performance of a utility against stated goals.
Performance monitoring	:	A continuous process of collecting and analyzing data to compare how well a utility / sector / program or policy is being implemented against expected results of the utility/sector/program or policy performance based on performance indicators.
Performance	:	The degree to which a utility operates according to specific criteria/ standard/ guidelines or achieves results in accordance with stated goal or plans.
Quality assurance	:	The activities and mechanisms set in place that guarantees that the performance data are collected accurately and objectively and the performance indicators are correctly calculated.
Ratio	:	The relationship in quantity, amount, or size between two or more parameters of utility performance
Reliability	:	Consistency of data and evaluation judgments, with reference to the quality of the instruments, procedures and analyses used to collect and interpret data.
Result based management	:	A management strategy focusing on performance, achievements of outputs, outcomes and impacts.
Stakeholder	:	Agencies, organizations, groups of individuals who have direct or indirect interest in the utility's performance or its evaluation.
Standard	:	An acknowledge measure of comparison (with a quantitative or qualitative value).
Survey	:	Systematic collection of information from a defined population, usually by means of interviews or questionnaires administered to a sample of units in the population (e.g. households, utilities, service providers).

Sustainability	:	The system of self-support of the performance assessment and continuous feedback.
Target group	:	The specific individuals or organizations who benefit from a better performing utility.
Target	:	Objective of the utility performance that can be measured by a specific performance indicator or group of indicators.
The Process Benchmarking Approach	:	This benchmarking approach requires detailed analysis of a utility's own business processes and comparison with organizations with exemplary performance.
Validity	:	The extent to which the data collection strategies and instruments measure what they intend to measure.

List of Abbreviations

JSC	:	Joint Services Council
WHO	:	World Health Organization
AID	:	Agency of International Development
ANERA	:	America Near East for Refugee Aid
ARIJ	:	Applied Research Institute
CHF	:	Save The Children Federation
CRS	:	Catholic Relief Service
GTZ	:	German Agency For Technical Cooperation
JSETs	:	The Joint Supervision and Enforcement Teams
JWC	:	Joint Water Committee
JWC	:	Joint Water Committee
KFW	:	German Bank of construction
MLOG	:	Ministry of Local Govern
NGOs	:	Nongovernmental organizations
NGOs	:	Non Governmental Organizations
PCBS	:	Palestinian Central Bureau of Statistics
PHG	:	Palestinian Hydrology Group
PNA	:	Palestinian National Authority
PNIC	:	Palestinian National Information Center
PWA	:	Palestinian Water Authority
UFW	:	Unaccounted For Water
UND	:	United Nations Development Program
UNRWA	:	United Nations for Refugees and Working Agency
USAID	:	United State Agency for Information
WB	:	World Bank
WBWD	:	West Bank Water Department

Abstract

This research aims to understanding how water service is conducted and structured through municipalities and village councils in Jenin Governorate, in the northern West Bank of the Palestinian Territories. The principle objectives of the study are to summarize pertinent facts and Fig.s (including financial) on the general business and operational environments of water service providers in Jenin area, to evaluate the performance of different providers, measured against key statistical and performance indicators, to provide a comparative view of performance in crucial areas of water supply and rate municipalities relative to each other against these indicators, to develop an adequate understanding of management and institutional aspects of water services delivery in an evolving and challenging environment; and, to identify innovative solutions to critical problems extent in the management of water services in Jenin area. The study further offered recommendations which will address problematic aspects of water delivery as determined in the study, and to provide means of improving water service for customers in Jenin Governorate.

Chapter One introduces the various institutional actors in the Palestinian water sector, and offers a historical outline of their creation, roles and responsibilities, up to the present time and including changes implemented in Oslo and other agreements. Chapter Two describes available surface and groundwater resources, and delineates the distribution of usage by different populations drawing on them. In Chapter Three, the demographics, economic bases and water management bodies in the Jenin Governorate are detailed and assessed. Chapter Four describes the methodology employed in the research, including background analysis, target institutions, field survey methods and analysis, and performance indicators. Results are presented and discussed in Chapter Five, and concluding recommendations, as noted above, are given in Chapter Six.

The performance of water utilities was investigated through a survey employing four categories of performance indicators. Specifically, those of financial, operational, personnel, and customer management performance. Following analysis of survey results, a benchmarking study was conducted in order to compare performance of these water institutions with each other, as well as against best practice utilities. The benchmarking of water supply utilities was done *vis a vis* collection, analysis, and comparison of key performance data among service providers (municipalities and village councils). Data was collected from municipalities and village councils for fiscal year 2005.

Benchmarking is a very important management and planning tool for managing water use. It can provide managers, mayors, boards of directors, ministries of local government, agencies and the Palestinian Water Authority with an overview of the current status of water supply providers in Jenin area. Benchmarking also can result in recommendation of solutions to development challenges and serve as a foundational tool for international organizations and donors when developing effective and efficient investment projects in water sector in Jenin governorate. Lastly, it can serve as a reference for municipalities and village councils to assess their performance, identify strengths and weaknesses, and develop solutions to their various, multi-tiered problems.

While the findings of the study showed variation in water service provision, service coverage in nearly all municipalities is very small and service is often intermittent, especially during the summer months. Many water utilities cannot account for more than 60% of the water they purchase or produce. This is a measure of physical losses due to

poorly maintained infrastructure, and commercial losses due to illegal connections. Most municipalities fail to cover operating costs leading to a lower level and quality of service. Furthermore, the cost of providing service is often inflated by overstaffing.

ادارة خدمة مياه الشرب في محافظة جنين: الوضع الحالي وحلول مقترحة

ملخص

يهدف هذا البحث إلى فهم آلية تأدية وتنظيم خدمة مياه الشرب للمشتركين من خلال البلديات والمجالس القروية في محافظة جنين في شمال الضفة الغربية من الأراضي الفلسطينية. وتتمثل الأهداف الرئيسية لهذه الدراسة في: تلخيص الوقائع والأرقام (بما فيها المالية) على الأعمال العامة والبيئات التشغيلية لمقدمي خدمات المياه في منطقة جنين، تقييم أداء مختلف مقدمي هذه الخدمات والمقاس حسب الإحصائيات الرئيسية ومؤشرات الأداء، تقديم رؤية مقارنة لأداء هذه الخدمة في مجالات تزويد المياه وقياس أداء هذه البلديات مع بعضها البعض بالنسبة لمؤشرات الأداء، تطوير فهم ملائم للجوانب المؤسسية والإدارية لخدمة المياه في بيئة مليئة بالتحديات ، وتحديد الحلول المبتكرة للمشاكل الحساسة في إدارة خدمة المياه في منطقة جنين.

وقدمت الدراسة أيضا توصيات من شأنها ان تعالج جوانب مشكلة تزويد المياه كما حددت في الدراسة، وتوفير الوسائل اللازمة لتحسين خدمة المياه للمشتركين في محافظة جنين. الفصل الأول يعرض مختلف المؤسسات العاملة في قطاع المياه الفلسطيني ، ويوفر لمحة تاريخية عن إنشاء وتحديد الأدوار والمسئوليات في هذه المؤسسات حتى الوقت الحاضر ، ومن ضمنها المؤسسات التي استحدثت والتعديلات التي طبقت في اتفاقية اوسلو وغيرها من الاتفاقات. الفصل الثاني يصف ما هو متوفر من المياه السطحية والجوفية ، ويحدد توزيع الاستعمال من قبل مختلف المستفيدين. ويضم الفصل الثالث الأسس الديمغرافية والاقتصادية لمحافظة جنين بالإضافة إلى المؤسسات التي تؤدي خدمة المياه في المحافظة. أما الفصل الرابع فيصف المنهجية المستخدمة في البحث والتحليل، بما في ذلك طرق المسح الميداني والتحليل ومؤشرات الأداء. وفي الفصل الخامس عرض للنتائج ومناقشتها. أما الفصل السادس فيضم التوصيات الختامية.

وقد تمت دراسة أداء خدمة المياه من خلال استخدام استبيان اعتمد على أربعة مجالات لمؤشرات الأداء وهي المالية، والتشغيلية، وإدارة الموظفين، وإدارة العملاء. وبعد تحليل نتائج الدراسة، أجريت دراسة مقارنة لمقارنة أداء هذه المؤسسات مع بعضها البعض، ومع مؤسسات ذات أداء مثالي. دراسة المقارنة لخدمة تزويد المياه تمت من خلال جمع المعلومات وتحليلها، والمقارنة بين بيانات الأداء الرئيسية لدى مقدمي الخدمات (البلديات والمجالس القروية). وقد جمعت بيانات من المجالس البلدية والقروية للسنة المالية 2005. المقارنة هي أداة مهمة جدا للإدارة والتخطيط لإدارة

استخدام المياه. ويمكن ان توفر لمحة عامة عن الوضع الحالي لإمدادات المياه المقدمة في جنين للمديرين ورؤساء المجالس وأعضاء مجالس الإدارة ووزارة الحكم المحلي والوكالات وسلطة المياه الفلسطينية. المقارنة بين مؤسسات المياه يمكن أن تقدم أيضاً توصيات بحاول للتحديات الإنمائية وان تخدم كأساس ومرجعية للمنظمات الدولية والمانحين عندما يتم تطوير وتنفيذ مشاريع في قطاع المياه في محافظة جنين. وأخيراً، يمكن أن تشكل مرجعا للباديات والمجالس القروية لتقييم أدائها، وتحديد مواطن القوة والضعف، ووضع حاول لمختلف المشكلات.

وقد بينت نتائج الدراسة وجود فروق في توفير خدمة المياه، كما بينت أن تغطية الخدمات في جميع الباديات صغيرة جداً وغالباً ما تكون الخدمة متقطعة، وخصوصاً خلال اشهر الصيف. وأن العديد من مؤسسات المياه لا تستطيع أن تحاسب على أكثر من 60 ٪ من المياه التي تنتج أو تشترى. هذا هو قياس للخسائر المادية بسبب ضعف البنية التحتية، والخسائر التجارية الناجمة عن التوصيلات غير المشروعة. وأخيراً أظهرت النتائج أن معظم الباديات لا تغطي نفقات التشغيل مما أدى الى انخفاض مستوى ونوعية الخدمة. علاوة على ذلك، فان تكلفة تقديم الخدمة كثيرا ما تتضخم بسبب كثرة الموظفين.

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Chapter one

Introduction

1.1 Background

In Palestine, domestic water supply system is publicly owned by municipalities and village councils and water institutions. Palestine is made of sixteen governorates, eleven of these are located in the West Bank , and five are located in Gaza. In these Governorates there are municipalities and village councils. These municipalities and village councils have water departments responsible for the management of water service. All cities have their own water management agencies, the biggest, well-run administrated, technically efficient (losses is only 26%), is Jerusalem Water Undertaking located in Ramallah and Al-Bireh Governorate of the Palestinian Territories. This Governorate includes the major central urban area, the cities of Ramallah and Al-Bireh, other municipalities and about 100 villages and refugee camps, are closed to being self-supporting. Other municipalities and village councils have their own water departments and sections that are in charge of management of water supply and developing the infrastructure and related works. Most of these municipalities operate under severe constrains: poor capacities, political instability, inadequate sources of funding. The management capacity of water departments belonging to municipalities are generally weak, it consists of few engineers, technicians, and administrative personnel. (Barghothe, 2004).

Many water institutions have fragmented institutional structures, or overlapping decision-making structures. Improvement of the water institutions performance has become highly imperative. Water institutions need improvement of human and organizational performance including the awareness of policy-makers. Most of the existing water supply networks in the West Bank and Gaza are in urgent need of repair and rehabilitation with leakage losses in the transmission and distribution networks of about 30-40% (Pecdar, 2004).

Each municipality has its own water source, more than 40 municipal wells in the West Bank that are used either wholly or partially by Palestinian institutions and municipalities.
Israel still specifying the pumping quota of each water supply in Palestine, water departments and institutions are struggling to afford water to their customers in their service areas. Also a direct damage to water and sewerage infrastructure from Israeli military actions in the West Bank Governorates between March and May 2002 . In addition to these problems, and of scarce water resources and/or poor operation and maintenance practice water service is not continuous in many Palestinian cities ,and they have to rotate the water supply in the pipes from neighborhood to neighborhood in order to distribute the little water available in what is called intermittent pumping. Residents in a particular sector of a city receive water for a few hours and then wait a few days for further water supply,

during which time other sectors of the town are supplied water in the same manner. Such programs are operated in Hebron, Nablus, Bethlehem, and Jenin.(Betselem,2004).

1.2 Study objectives

The objectives of the study are to:

- Summarize pertinent facts and Fig.s (including financial information) on the general business and operational environments of water service providers in Jenin area.
- Discuss performance of the different providers against key statistical and performance indicators such as water coverage , water consumption and production.
- Provide a comparative view of performance in the crucial areas of water supply and rating the municipalities relative to each other against these indicator.
- To acquire adequate understanding of management and institutional aspects of
- water services delivery in an evolving and challenging environment.

1.3 Water supply management in Palestine

Due to many Israeli military orders issued in 1967, the existing Palestinian institutions were restricted to operating and participating in an extremely limited range of activities regarding water supply administration, including operation and maintenance. Therefore, there has been no chance of promoting a new water institution, nor strengthening the existing institutions to be involved in formulating water plans and strategies.

1.4 Water institutions in Palestine

There are many institutions responsible for water service in Palestine: Palestinian Water Authority ,West Bank Water Department, Water Departments in municipalities and village Councils, water institutions like Jerusalem Water Undertaking, Water and Sanitation Authority-Bethlehem, Joint Services Councils like Joint Services Council for water and wastewater for Jenin western villages, Israeli water company (Mekerot).

1.4.1. Palestinian Water Authority:

Palestinian Water Authority is an independent central authority, it is responsible for all water resources in West Bank and Gaza including sewerage water and reuse, planning the water policy and development water sources. The Palestinian Water Authority (PWA) has been established under the presidential resolution No. 90 of 1995, to be as central authority, acting under the direct responsibility of the President of the Palestinian National Authority. In February 1996 the Government of Norway signed an Agreement with the Palestinian Authority represented by the Palestinian Water Authority. The main objectives were to build and function a sustainable institution (PWA) responsible for the management and protection of the Palestinian Water Resources. Through the development of certain water management tools such as the internal regulations, the water resources management strategy, the water law and the tariff regulation. PWA is the regulatory body for Palestinian water resource management and development with its main goal being to ensure the equitable utilization and sustainable management and development of Palestinian water resources.

The Palestinian Water Authority has prepared the National Water Plan which defines a huge investment program of Projects needed for water sector development over the next 20 years.. This covers seven main water categories:

- Water supply
- Wastewater
- Storm water
- Water resources
- Water conservation
- Agriculture
- Capacity building.

1.4.2. West Bank Water Department:

In 1961 the Jordanian Central Water Authority established the West Bank Water Department to manage water resources in the West Bank. In 1967 and soon after the Israeli occupation (WBWD) was under the control of the Israeli Officer for Water Affairs who was linked to Israeli military governor and later to civil administration. West Bank Water Department act as an executing organization to Palestinian Water Authority, and it co-ordinates the transaction between Palestinian Water Utilities and Mekorot. (Barghothi, 2004)

In general, (WBWD) is the biggest water distributor and the supervisor on most of water networks in the West Bank, (WBWD) institutional structure consist of:

- Administrative and Financial Affairs department.
- Engineering and planning department.
- Operation and Maintenance department.

The tasks of West Bank Water Department are as follows:

- Supervising the construction and the Operation and Maintenance of the pumping stations.
- Water and chlorine distribution.
- Monitoring groundwater.
- Collecting bulk water cost from local institutions
- Preparing water projects, tender specifications and supervising projects implementations.
- Supervising Palestinian Water Authority, Municipalities, and village councils.
- Forwarding water projects to the Joint Water Committee (JWC).

1.4.3. Municipalities, village council, local committees:

In the pre-1948 period, the main source of water in both the West Bank and Gaza strip was groundwater. After the 1948 war, the United Nations for Refugees and Working Agency (UNRWA) took the responsibility of supplying water to refugee camps; the municipalities supplied the cities and, in part, the camps located within their territories. This split situation continued until 1964 when the Jordanian government, after having received a grant from

the Agency of International Development (AID), established Jerusalem District Water Authority to develop water supply projects in cooperation with the municipalities**.**

Water service including building and maintaining water infrastructure is the responsibility of municipalities and village councils in Palestine, they have water departments that in charge of planning, development, management, and maintenance of drinking water networks in their service areas. In most municipalities there is a water department responsible for management of the water supply. Municipalities and Village Councils often lack expertise, personnel, financial resources, environmental awareness and authority to manage water supply system efficiently. They also have no separate budget for water sector, and the revenues that are generated by water department is used to subsidy other sectors (Barghothi, 2004)

The water situation in most municipalities is characterized by ineffective management and low experience. Municipalities and village councils have weakness in the following fields:

- Management and administrative
- Technical skills
- Coordination and cooperation

This is evident in the improper planning, high unaccounted for water, low fees collection, unjust tariffs and weak awareness.

1.4.4. Non- profitable institutions:

Some municipalities and village councils have developed rejoined utilities to supply water service to their customers, they are independent from municipalities, these utilities are:

- Jerusalem water undertaking for Ramallah and Al-bireh governorates
- Water and Sanitation Authority for Bethlehem, Beit Jala, Beit Sahur.
- Joint services council for Jenin Western Villages which is responsible for water supply for eleven villages in Jenin area.

1.4.5. Water departments in some ministries:

Many ministries have water departments that deal with water supply and water resources like:

1.4.5.1. Ministry of Agriculture:

The role of this ministry is coming through the general directorate of water and irrigation which has it's activities in conserving and managing the water resources that utilizing for agricultural purposes. It is also responsible for guiding the agricultural sub- sector ,which represent a major Palestinian water user. The intervention of the ministry of Agriculture in the sector does not involve the direct management of water resources, however , the ministry provides planning for agricultural development and extension service influencing irrigation water used and protection of water quality. These activities have direct impact on water demand for this sub-sector. The Ministry Of Agriculture is also responsible for reviewing and issuing permits(pending PWA approval) for new irrigation water wells (CH2MHILL, 2003).

1.4.5.2. Ministry of Environment:

The water department belongs to this ministry have two important missions: first collecting and monitoring water pollution, second controlling and monitoring water quality.

1.4.5.3. Ministry of Health:

The main job for this ministry is coming through it's departments, which are distributed in all governorates, they monitor quality of water. The ministry is also responsible for establishing and regulating health standards including drinking water standards (CH2MHILL, 2003).

1.4.5.4. Ministry of Planning and International Cooperation

It is responsible for Palestinian development in all sectors. Despite some planning responsibilities have been transferred to Palestinian Water Authority the ministry is still a strategic stakeholder in the water sector due to its overall visionary responsibility for Palestinian development and its planning experience (the previous reference).

1.4.6. Nongovernmental organizations (NGOs):

- The Palestinian Hydrology Group (PHG): a non-profit, non-government organization that protects and develops the water resources in Palestine.
- Applied Research Institute (ARIJ): Founded in 1990, a non-profit organization dedicated to promoting sustainable development in the occupied Palestinian territories.
- (ARIJ) is putting a large water, land use, and environmental database.
- Universities: Palestinian university represents a store of social and natural science capacity.
- United Nation Relief and Work Agency(UNRWA): It has been operating and managing water service in many refugee camps since 1949
- Many international organizations and development agencies: like World Bank (WB). German Agency for Technical Cooperation (GTZ). United State Agency for International Development (USAID).The role of USAID is unique from the other international institutions. USAID is the only donor that gets involved with the work of the JWC. Improving water quality and increasing water supply was the main priority of(USAID).Their projects has been contracted out to American construction firms such as Metcalf and Eddy, Camp, Dresser and McKee, and CH2M-Hill.
- United Nations Development Program (UNDP), German Bank of Construction (KFW), Save The Children Federation (CHF), America Near East for Refugee Aid (ANERA), Catholic Relief Service (CRS).

1.4.7. National Water Council:

National Water Council joints some of miniseries and different institution that are concerning the water development, the main task and mission for this council is admitting the Palestinian water policy. The National Water Council according to the Law No 2 of 1996 is chaired by the President of the Palestinian National Authority and consists of the following:

- PNA President (Head)
- Minister of Agriculture responsible for development of agriculture.
- Minister of Planning responsible for international cooperation and national planning issues.
- Minister of Justice responsible for justice and legal enforcement issues.
- Minister of Industry Responsible for effluent standards, reuse of industrial wastewater and public enquiries about industrial water licenses.
- Minister of Local Government – Responsible for local (urban) planning.
- Representative of Palestinian Universities.
- The National Water Council review and approve national water policies and water quotas.

1.4.8. Joint Water Committee (JWC):

It was established under Clause 11 of Article 40 of the Israeli-Palestinian Interim Agreement (Oslo II Agreement).The function of the JWC is to deal with all water and sewage related issues. The main function of the JWC is to handle all water and sewage related issues. The members of the JWC are mainly technical experts and policy makers. The Israeli Water Commissioner and the Palestinian head of the Palestinian Water Authority (PWA) head the committee.

The other members in the committee in the Israeli side include representatives from the Israeli Water Commissioner's Office, the Hydrological Service, the Mekorot Water Company, the Israeli Environmental Ministry, the Israeli Defense Ministry and the Israeli Civil Administration. On the Palestinian side there are representatives from the Palestinian Water Authority and from the West Bank Water Department.

Its responsibilities include monitoring of water use, research and development of more efficient mechanisms of water distribution, resolution of water disputes, and arrangement for water supply from one side to another. The JWC is bilateral and it does not include a third party. there is an unofficial tri-lateral Israeli-Palestinian American committee. This committee meets together every three or four months to discuss projects in which the Americans have interest The JWC is comprise of an equal number of Israeli and Palestinian representatives. There is no reference to arbitration or other third party dispute resolution mechanisms, Israel can block any new water development in the for Palestinian or undertake building projects The JWC decisions are made by consensus, and no mechanism is established to settle disputes where a consensus cannot be attained. This method of decision-making means that Israel is able to veto any request by the Palestinian representatives the procedure of licensing water projects in the JWC is shown below**.** However (Fig 1.1) illustrates the complex licensing procedure of water projects by Israel .

1.4.8.1. Supervision and Enforcement Teams (JSETs):

Another institutional structure created in the water accords is the Joint Supervision and Enforcement Teams (JSETs) for the West Bank. The JSETs are composed of 5 teams with at least two representatives from each side to monitor, supervise and enforce the implementation of Article 40. Its responsibilities include monitoring connections to the supply systems, the drilling of new wells, development of new water supply projects and prevention of contamination of water resources. In a sense, the JSETs are the equivalent of

"water enforcers" roving the area to make sure that the new water accords are being followed by both Israel and the Palestinian Authority.

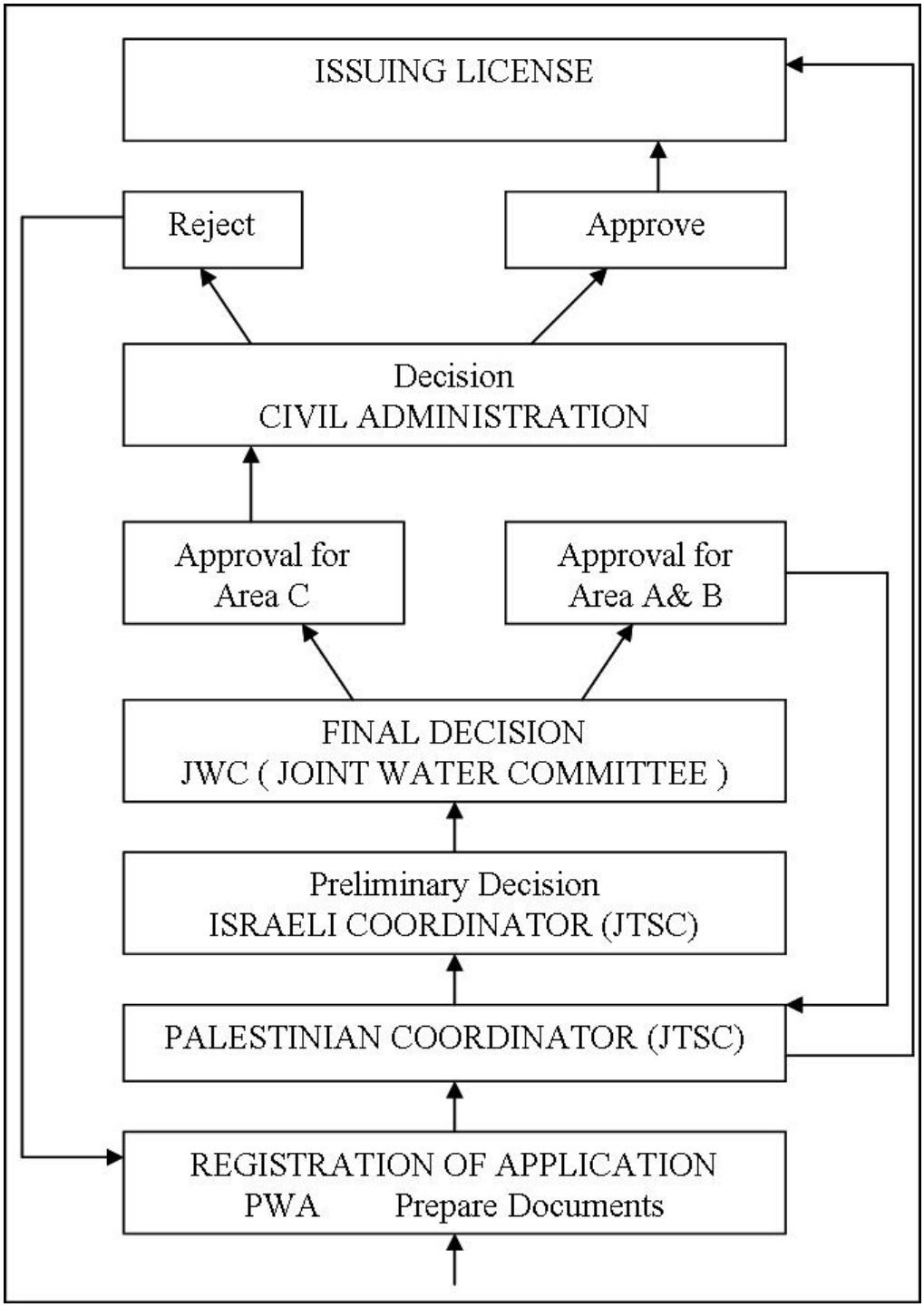

Fig 1.1: illustrates the complex licensing procedure of water project (Zietonn, 2006).

The existing Institutional Framework is also shown below (Fig. 1.2) where the structure of the sector and the allocation of roles and responsibilities as explained in the World Bank report.

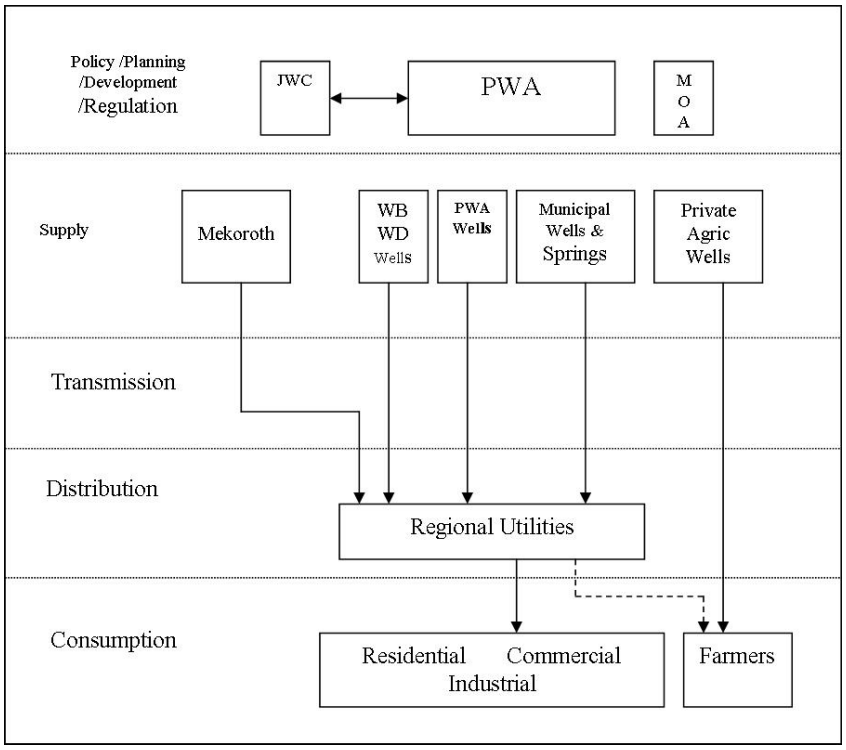

Fig 1.2: existing structure of the water sector in Palestine,(WB, 2004)

While PWA policy is to establish an effective regulatory framework and a bulk supply company, and efficient regional utilities in Gaza and the northern and southern West Bank, strengthening JWU as shown in Fig (1.3).

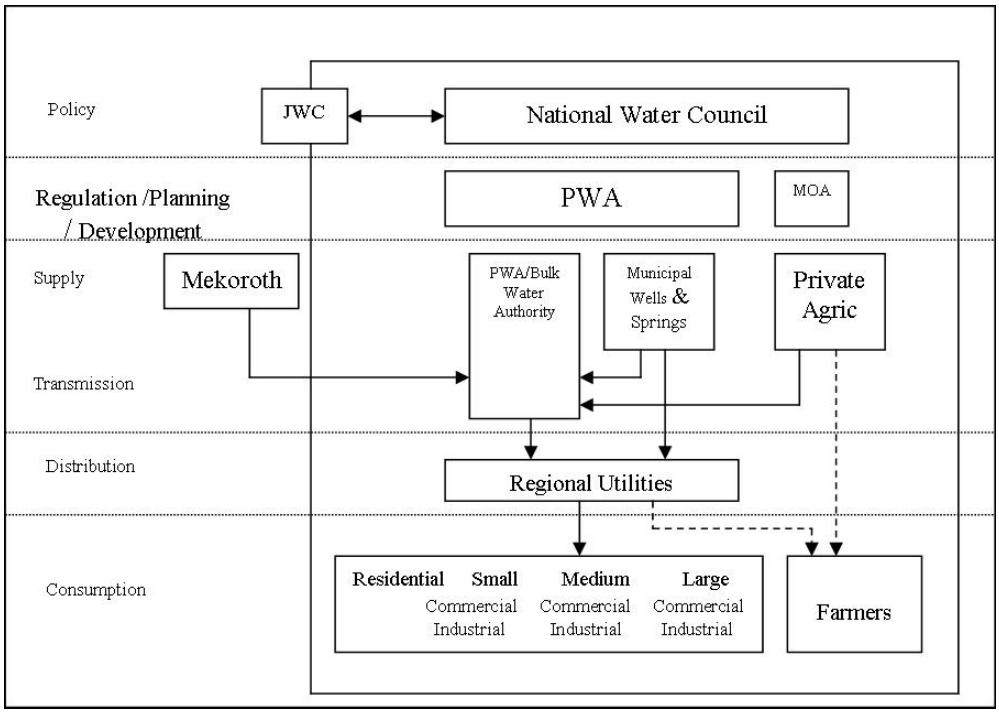

Fig. 1.3: Proposed institutional framework for water sector (WB, 2004)

Water Sector Institutional Framework is also defined by PWA in the National water plan. According to National Water Plan There are three levels of functionality. These levels are:

- Decision making level: The National Water Council which is made up of key governmental ministries is responsible for the decision making level
- Regulatory level: PWA is the regulator Body
- Operational level: Regional water utilities and water users associations is responsible for operational level

Fig. (1.4) below illustrates this framework.

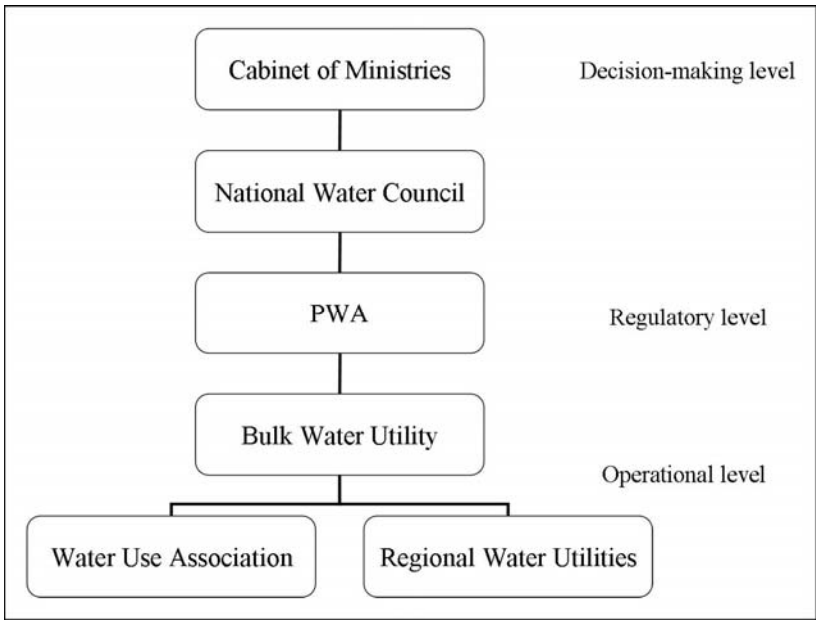

Fig .1.4: Water Sector Institutional Framework (CH2MHILL,2003).

1.4.9. Accounting system used in water institutions:

Water departments in municipality are not operated in efficient manner these departments are not operated on sound business principles as self-sufficient departments. Municipalities do not use a uniform system of bookkeeping to record all the financial activities of all funds of the municipality. The financial activity of each individual fund is not recorded in a set of self-balancing accounts. This means that all of the assets, liabilities, retained earnings, revenues and expenses relating to water fund are not accounted for separately from any other fund. In other words, the financial activity of the Water Fund is not recorded separately from that of the General Fund so revenues for the Water department can not be easily identified. In addition the revenues generated from charges for water service is not used for the use and benefit of the water department activities.

1.5 Historical background of local government in Palestine

- During the role of Ottoman to Palestine before 1917 there were twenty-two municipalities in Palestine; these municipalities were established under the Ottoman municipal law of 1877.

- In the rural areas also the Turks had provided in law for a system of local government (the Willayat Law of 1864)
- In every village, or community of a village, the central Government was represented by a –mukhtar, normally the mukhtar monopolized all local functions with village elders as members of village council. But both in the municipal and rural areas the administration of local affairs was carried out by the direct representatives of the central government in Istanbul.
- In 1921 a Local Councils Ordinance was enacted by the British Administration in order to create local bodies of more representative nature **.** Mean while municipalities continued, however, to operate under Turkish law until the Municipal Corporations Or-dinance was enacted in 1934. The only two municipal councils established since Turkish times were those of Tel Aviv (1934) and Petah Tiqva (1937)for political reasons (Nakhleh Issa,1991).
- Thus, the functions of local government exercised by municipal councils, local councils and village councils under the authority contained in the Municipal Corporations Ordinance, 1934, the Local Councils Ordinance, 1941, and the Village Administration Ordinance, 1944) (Nakhleh Issa,1991).

The municipal councils were established in the intensively urban areas, the local councils in the smaller towns ,village councils in areas which are exclusively rural The number of local authorities in 1947 were as shown in the Table (1.1).

Table 1.1 show types and numbers of village councils in 1947 (Nakhleh Issa,1991).

Type	**Arab**	**Jewish**	**Mixed**	**Total**
Municipal councils	18	2	4	24
Local councils	11	26	1	38
Village councils	40	--	--	-40
Total	69	28	5	102

The following (Table 1.2-a, Table 1.2-b, Table 1.3-a, Table 1.3-b) is a complete list of these local authorities, by Districts, indicating the population which each serves:

Table 1.2-a: Municipal councils in 1947 (Nakhleh Issa,1991).

District	**Name of Council**	**Arab, Jewish or mixed**	**Population 1944**
Gaza	Beersheba	Arab	5,570
	Gaza	Arab	34, 170
	Khan Yunis	Arab	1 1,220
	Majdal	Arab	9,910
Lydda	Jaffa	Arab	94,3 10
	Lydda	Arab	16,780
	Petah Tiqva	Jewish	17,250
	Ramle	Arab	15, 160
	Tel Aviv	Jewish	166,650

Table 1.2-b: Municipal councils in 1947 (Nakhleh Issa,1991).

District	Name of Council	Arab, Jewish or mixed	Population 1944
Jerusalem	Beit Jala	Arab	3,710
	Bethlehem	Arab	8,820
	Hebron	Arab	24,560
	Jerusalem	Mixed	157.080
	Ramallah	Arab	5,080
Haifa	Haifa	Mixed	128,800
	Shafa 'Amr	Arab	3,640
Samaria	Jenin	Arab	3,990
	Nablus	Arab	23,250
	Tulkarm	Arab	8,090
Galilee	Acre	Arab	12,360
	Beisan	Arab	5, 180
	Nazareth	Arab	14,200
	Safad	Mixed	11,930
	Tiberias	Mixed	11,310

Table 1.3-a: local councils in 1947 (Nakhleh Issa,1991).

District	Name of Council	Arab, Jewish or mixed	Population 1944
Gaza	Faluja	Arab	4,670
Lydda	Bat Yam	Jewish	2,000
	Benei Beraq	Jewish	5,760
	Giv'atayim	Jewish	5,800
	Herzliya	Jewish	4,650
	Holon	Jewish	3,280
	Kefar Sava	Jewish	4,320
	Magdiel	Jewish	1, 100
	Petah Tiqva (rural)	Jewish	-
	Ra'anana	Jewish	3,290
	Ramat Gan	Jewish	10,200
	Rehovot	Jewish	10,020
	Rishon le Zion	Jewish	8, 100
	Sarona	Templar	150
Jerusalem	Beit Sahur	Arab	2,770
	El Bira	Arab	2,920
	Jericho	Arab	3,010

Table 1.3-b: local councils in 1947 (Nakhleh Issa,1991).

District	Name of Council	Arab, Jewish or mixed	Population 1944
Haifa	Ezor Ephraim	Jewish	1,672
	Ezor Hakishon	Jewish	1,864
	Hadera	Jewish	7,520
	Karkur	Jewish	900
	Kefar 'Atta	Jewish	1,690
	Kiryat Motzkin	Jewish	2,740
	Yoqne'am	Jewish	265
Samaria	Anabta	Arab	3, 120
	Emek Hefer	Jewish	5,040
	Kfar Yona	Jewish	480
	Natanya	Jewish	4,900
	Qalqiliya	Arab	5,850
Galilee	'Afula	Jewish	2,310
	El Bassa	Arab	2,950
	Ezor Israel	Jewish	2, 100
	Ezor Hahalal	Jewish	3, 168
	Kafr Yasif	Arab	1,400
	Saffuriya	Arab	4,330
	Nahariya	Jewish	1,440
	Samakh	Arab	3,460
	Tarshiha	Arab	3,830

1.6. Local Government in the West Bank, under Jordanian rule

In March 1949 the Hashemite regime divided the West Bank into three districts: Hebron, Ramallah, and Jerusalem. And appointed Palestinian civil governors of these districts, Minister of Interior enjoyed the right to call municipal elections, the right to dismiss municipal councils, the right to appoint new ones, the right to appoint and dismiss mayors and to fix their salaries, and the right to control municipal councils' budgets.

In 1954,— King Husayn adopted the municipal law no. 25, of 1954. According to the law, local councils comprised of 3-11 appointed members were supposed to be established in any village with a population of 2,500 inhabitants, members of these councils were to be appointed by each district's civil governor, who was empowered to approve all administrative, technical and financial decisions made by the councils. At least 96 rural councils were appointed and regulated by the 1954 law. The law called for municipal elections every four years In addition, the law limited the power of the Minister of Interior over the municipal councils.

The law thus weakened the municipalities' ties to the central authority in Amman, . Unlike the municipalities in the East Bank, most municipalities in the West Bank suffered a lack of revenues sufficient to cover their expenditures.

1.7 Local Government and the Palestinian Authority

In June 1967, the Israeli occupation authorities limited municipalities powers and solidified their control over policies and budgets; the Arab Jerusalem Municipality Council was completely dissolved. In the West Bank and Gaza, political and administrative circumstances led to decentralization. As a result of the Israeli occupation and the lack of a Palestinian central government, local institutions took control of services. After the arrival of the Palestinian National Authority, the West Bank and Gaza were divided into Sixteen Governorates (11 in the West Bank: Jenin, Tubas, Tulkarm, Qalqilya, Salfit, Nablus, Ramallah, Jerusalem, Jericho, Bethlehem, Hebron and five Gaza: Jabalya, Gaza City, Deir Al-Balah, Khan Yunis and Rafah). Each of these is headed by a governor appointed by Pres. Arafat. During the Palestinian Authority, the municipal and village councils also took over administrative responsibilities like water services currently, there are 105 municipalities (89 in the WB and 16 in Gaza).

The Ministry of Local Government now is representing the Municipalities in national decision making and is involved in the coordination of local water sector operations

1.8 Villages not connected to water networks

There are 215,000 Palestinians in 220 villages living in communities without a running-water network (Betselem,2004). The Table (1.4) below shows Population of the West Bank Unconnected to Running-Water Network in 2005, by Districts .

Table 1.4 show un connected communities to water network.(PWA, 2004).

District	Number of residents	Communities not Connected to Running-water Network	Residents in Unconnected Communities	Residents not Connected to Running-water Network (%)
Jenin	254,200	39	45,000	18
Tubas	46,600	16	16,800	36
Tulkarm	167,900	13	18,500	11
Nablus	326,900	27	68,700	21
Qalqiliya	94,200	16	15,000	16
Salfit	62,100	2	8,500	14
Ramallah	280,800	4	2,000	0.8
al-Quds	149,150	3	1,370	0.9
Bethlehem	174,650	12	3,000	2
Hebron	524,500	88	36,300	7
Jericho	42,300	0	0	0
Total	2,123,300	220	215,170	10

households in these communities rely on water collected in cisterns in the wet winter months .45 percent of the rural areas (37 percent of the population) in the West Bank depend on rainwater harvesting to satisfy their basic water needs(PWA,2004). these

Cisterns are built by digging, pear-shaped hole (njasa) in the ground , with a cement floor and plaster coated walls, and an opening in the top to allow access,. cistern can store 70 to 100 m^3 of rainfall, which is accumulated from rooftop catchments during the winter residents use the water in the cistern for all their needs. In the spring and summer months, when cisterns dry up the residents have to rely on:

- water from nearby springs
- water brought by private water-tankers.

Chapter two

Water resources in Palestine

2.1 Introduction

The West Bank and the Gaza Strip are those parts of historic Palestine which are now separated by Israel. The West Bank is situated west of the Jordan River and the Dead Sea, Its area is 5,860 km². The climate of the West Bank varies a lot, with most of the rainfall in the north and the west. Gaza Strip area is 367 km^2 (approximately 45 km in length and 7 to 12 km in width) is situated in the southern part of the coastal plain. The climate in Palestine is of the Mediterranean type, it can be characterized as hot and dry in the summer and cool and wet in winter Palestine is one of the world's most water-stressed countries. Palestine is one of the driest and most water scarce countries in the world where the demand for fresh water is exceeding the available water resources.

Water is a scarce and precious resource in Palestine, shared water resources; Population growth; rising living standards and urbanization increase the pressure on the resource. In addition to water scarcity, the Palestinians are being denied access to their water resources by Israel, also rapid urbanization and increasing growth of population cause continuous pressure on the quality of the water resources in Palestine, which is deteriorating rapidly. While The World Health Organization (WHO) recommends 100 liters of water per person per day as the minimum quantity for basic consumption, most Palestinians have considerably less. According to B'Tselem, (the Israeli human rights organization) per capita water consumption for Palestinians in Palestine is less than seventy liters per person per day. Palestinian water resources consist of:

2.2. Rains

Rains are the main source of water in Palestine, , there is considerable inter-annual variability in rainfall ,the rainwater amount falling in Palestine is changeable from year to another and from area to another according to the topographical conditions such as: Height and depression regarding sea surface, and conditions of area location .The bulk of the rain falls during just four months (November-February), its intensity declining from its highest level in the northern mountain are to its lowest level in the Jordan Valley and the southern part of the Gaza Fig (2.1) shows the average annual rain in the West Bank.

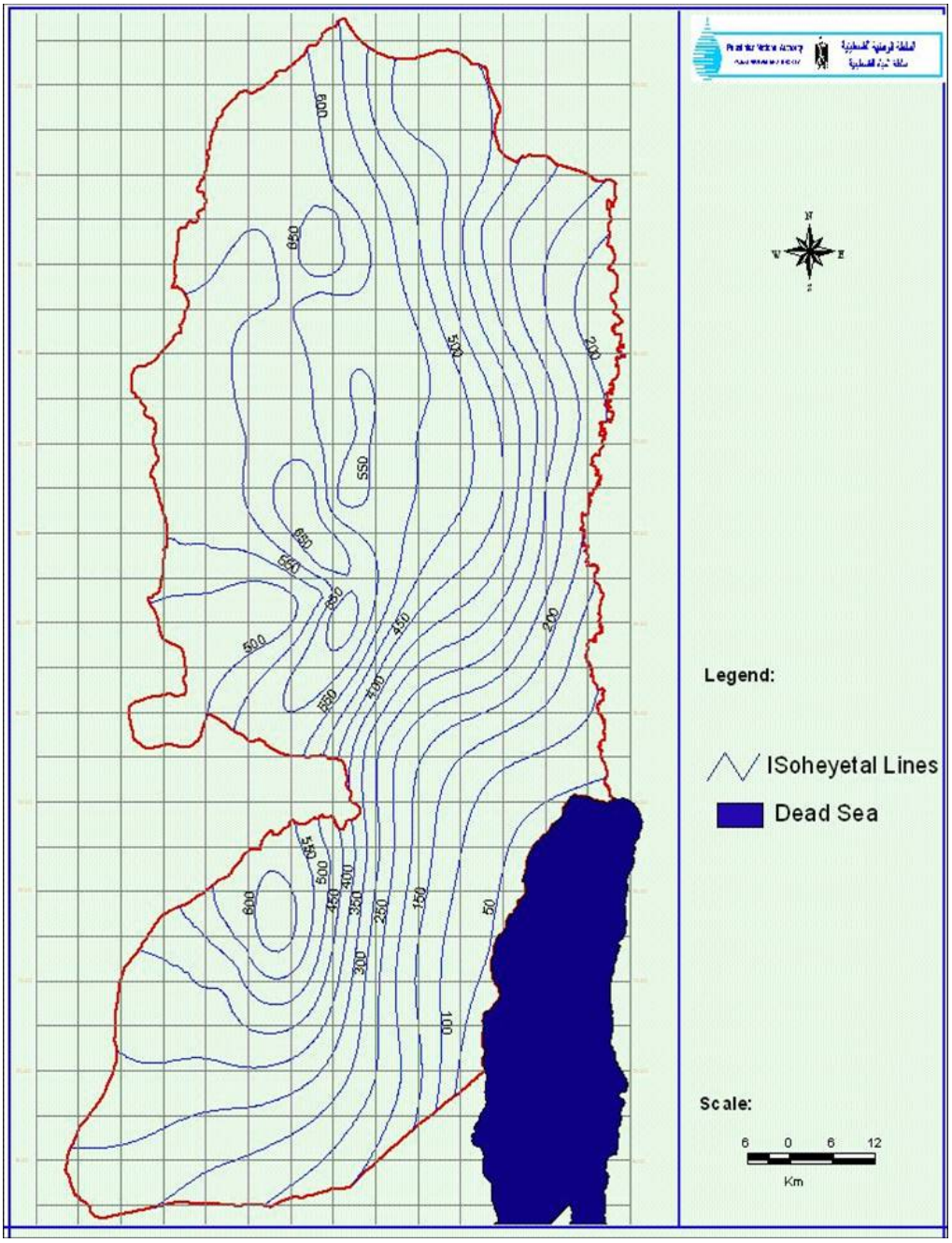

Fig 2.1: Average annual rain in the West Bank (PWA,2006).

The average annual rain fall in West Bank varies between 700 mm in the mountain region and 100 mm in Jordan valley and 300 mm in south part of Gaza strip while it reaches 500 mm in north part Rains are the feeder of groundwater aquifer, surface water, valleys . The total amount of annual rainfall that falls in the winter season (November to may) determines the volume of recharge to the groundwater. However, the rainwater amount falling in Palestine is changeable from year to another, Fig. (2.2) below illustrate the total amount of rain fall since 1954

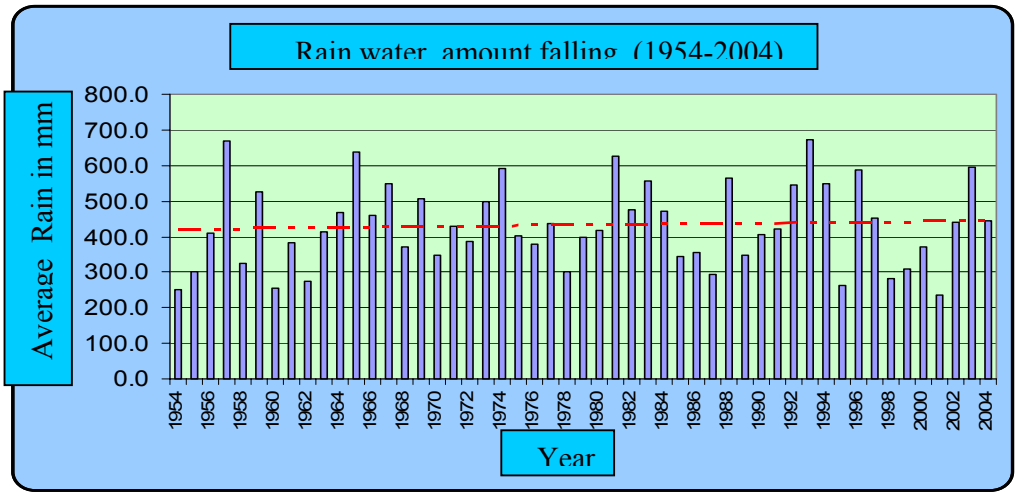

Fig 2.2: West Bank annual rain water (2004-1953) (PWA, 2006).

Table 2.1: annual rain fall during the year 2004-2005 (PWA, 2006).

City	Rainfall 2004 mm	Mean annual rainfall (mm)	Deviation from mean	Percentage of rain fall from the mean	Recharge quantities Million cubic meter
Jerusalem	501.7	423	18.6	118.6	43.9
Nablus	574.9	564	1.9	101.9	91.0
Rammallah	555.8	545	2.0	102.0	120.4
Jenin	402.8	531	-24.1	75.9	61.1
Qalqilieh	502.6	613	-18.0	82.0	22.7
Tulkarem	505.5	613	-17.5	82.5	32.0
Jericho	114.9	164	-29.9	70.1	18.9
Bethlehem	409.9	443	-7.5	92.5	65.8
Hebron	480.3	415	15.7	115.7	190.7
Average	443.7	454.00	-2.3	97.7	647.4

2.3 Surface water (Water courses (wadis))

The West Bank is a landscape of extreme topographical variation, ranging from three hundred metres below sea level at the shores of the Dead Sea, to about one thousand metres in the high summits of West Bank . (Eyal Weizman, 2002). Surface flood runoff in the West Bank is mostly intermittent and probably occurs when the rainfall exceeds 50 mm in one day or 70 mm on two consecutive days. The runoff is estimated at about 64 MCM/yr in the West Bank (A1-Khatib, 1989; Abu Mayleh, 1991).

Wadis flow during the flood periods, which happen for just a few days every year in the winter season. There are many wadis in the West Bank, some of which flow to the west reaching towards the Mediterranean Sea, while the others flow to the east until they reach the Jordan River. Only four wadis are permanent in the West Bank, all of which flow to the east and reach the River Jordan. These are: Wadi Fara'a, Qilt, Malih and Auja. The quantities of lost flooded surface water are estimated to be 110 Mm3/y (PWA,2006) In

addition to these wadis, there are seasonal lakes in the West Bank, especially Marj Sanur in the Jenin Governorate. It floods and becomes full with water in the winter season. It remains full for several months of the year, depending mainly on the rainfall quantities and distribution.

Surface water bodies, whether wadis or seasonal lakes, have not yet been studied in detail. There is a need for more detailed and extensive studies in order to have better estimates for the available water quantities in them, and to find out the best ways for using their water. Streams flowing from the west towards the Jordan Valley recharge shallow aquifers such as Wadi al-Qilt, Auja and Wadi al-Far'a (Assaf, 1991). The flood wadis can be divided according to the flood flow direction as follows:

2.3.1. Eastern wadis:

like the wadis shown below in table (2.2) which shows these wadis and the flooded quantities in the year 2004.

Table2.2 available surface water in Palestine,(PWA,2006

Noweemeh	1-2	0.75
Farea	3.5-11	6.2
Alahmer	1-2	4.2
Aloja	2-3	4.4
Alqilt	3-11	4
Total	9-29	20.65

2.3.2. Western Wadis

Like the wadis shown below in table no(4) which shows these wadis and the flooded quantities in the year 2004

Table 2.3: available surface water in Palestine,(PWA,2006)

Wadi	**Annual mean flooded quantities (MCM/Yr)**	**Flooded quantities in year 2004 (MCM/Yr)**
Zeemar	8.7	8.7
Al-teen	8.1	7.5
Qana	12.8	12.2
Sreeda	22.8	21.5
Deleb	16.4	15.5
Alnar	4.9	4.5
Almoqatea	3.6	3.5
Abo Nar	8.3	8
Mass	11.7	11
Total	97.3	92

The eastern flood wadis that have an average total annual flood flow volume of about 19 MCM/yr. The western flood wadis that have an average total annual flood flow volume of about 97.3 MCM/yr.

In the Gaza Strip, runoff water is collected in small wadis and valleys within the area. The northeastern part of the Gaza Strip also contains some wadis. Their soils have a low infiltration capacity; therefore, there are many surface run-offs during intensive rainfall. According to the Palestinian Water Authority, the quantity of storm water runoff in the West Bank is 110 million m^3/yr. Only 2 million m3/yr of storm water runoff is generated within the Gaza Strip.

None of this water is presently intercepted, An estimated 13 to 15 million m3 could be captured through construction of storage structures on four of the principal wadis draining eastward in the West Bank (Wadis Fara'a, Badan, Maleh, and Qilt).

2.3.3. The Jordan River:

It is 351 kilometers long. Its tributaries are the Hasbani which flows from Lebanon, the Banias arising from a spring at Banias at the foot of Mount Hermon, and the Dan, whose source is also at the base of Mount Hermon. The three merge to form the Jordan in northern Palestine. Annual stream flow in the Jordan Basin may be as low as 420 million m3/yr and during wet years it may be as high as 2,460 million m3/yr .

Israel denies Palestinians their rightful utilization of the Jordan River Since the beginning of the Israel's military occupation of the West Bank in 1967, land adjoining the Lower Jordan River has been declared a "closed military zone" and, thus, for Palestinians, access to the Lower Jordan River has been consistently denied.(Bittar maher,2005). .It is the only river which the West Bank has access to. At the time being, however, the West Bank uses nothing of its water. According to the Johnson plan of 1955, the share of Jordan (together with the West Bank) was estimated to be 774 Mm3/y out of 1287Mm3/y, the total quota for all riparian countries of the river. Out of the 774Mm3/y share of Jordan, the West Bank share is found to be around 215Mm3/y (El-Musa, ,1996.)

Israel occupation of the Golan, have resulted in Israeli control of many of the headwaters of the Jordan River. Furthermore, Israel expelled Palestinians from the area of the West Bank bordering the Jordan River, denied access by Palestinians to Jordan River water resources, and established settlements (most of which are agricultural) in the strip of land bordering the River. Israel withdraws water from the north-western portion of Lake Tiberias and transports it out of the Jordan River Basin through its National Water Carrier to coastal cities and the Negev Desert.

The amount of water extracted is such that very little water flows naturally out of Lake Tiberias. This means that only a trickle passes along the West Bank in the bed of the Lower Jordan River. In addition, Israel has denied Palestinians access to the entire Lower Jordan River since 1967. After the start of Israel's military occupation in 1967, Israel declared West Bank land adjacent to the Jordan River a "closed military zone," to which only Israeli settler farmers have been permitted access

2.4 Groundwater (wells-springs)

Ground water is the main source of the Palestinians freshwater supply. In the West Bank, the aquifer system is comprised of several rock formations that are recharged from rainfall in the West Bank.

In years of normal rainfall, some 600-650 MCM of rain per year infiltrate the soil and replenish the aquifers. The West Bank ground-water resources consist of the: Mountain Aquifer system. The Mountain Aquifer is The largest and cleanest water source between the Jordan River and the Mediterranean Sea, providing drinking water to both Israelis and Palestinians. It is located west of the Jordan River covering the central area of the West Bank and a wide strip of adjacent Israeli territory This aquifer is the only source of water for Palestinians in the West Bank and the main provider of freshwater to Israelis. The majority of its natural recharge area lies within the West Bank territories with two of its three basins flowing naturally toward Israel. In 1967, Israel occupied the West Bank and imposed strict control policies over the utilization of the Mountain Aquifer's water. This mountain aquifer system flows in three main directions, according to which three main groundwater drainage basins can be identified, namely the Western, Northeastern and Eastern Aquifer Basins (Fig 2.3).

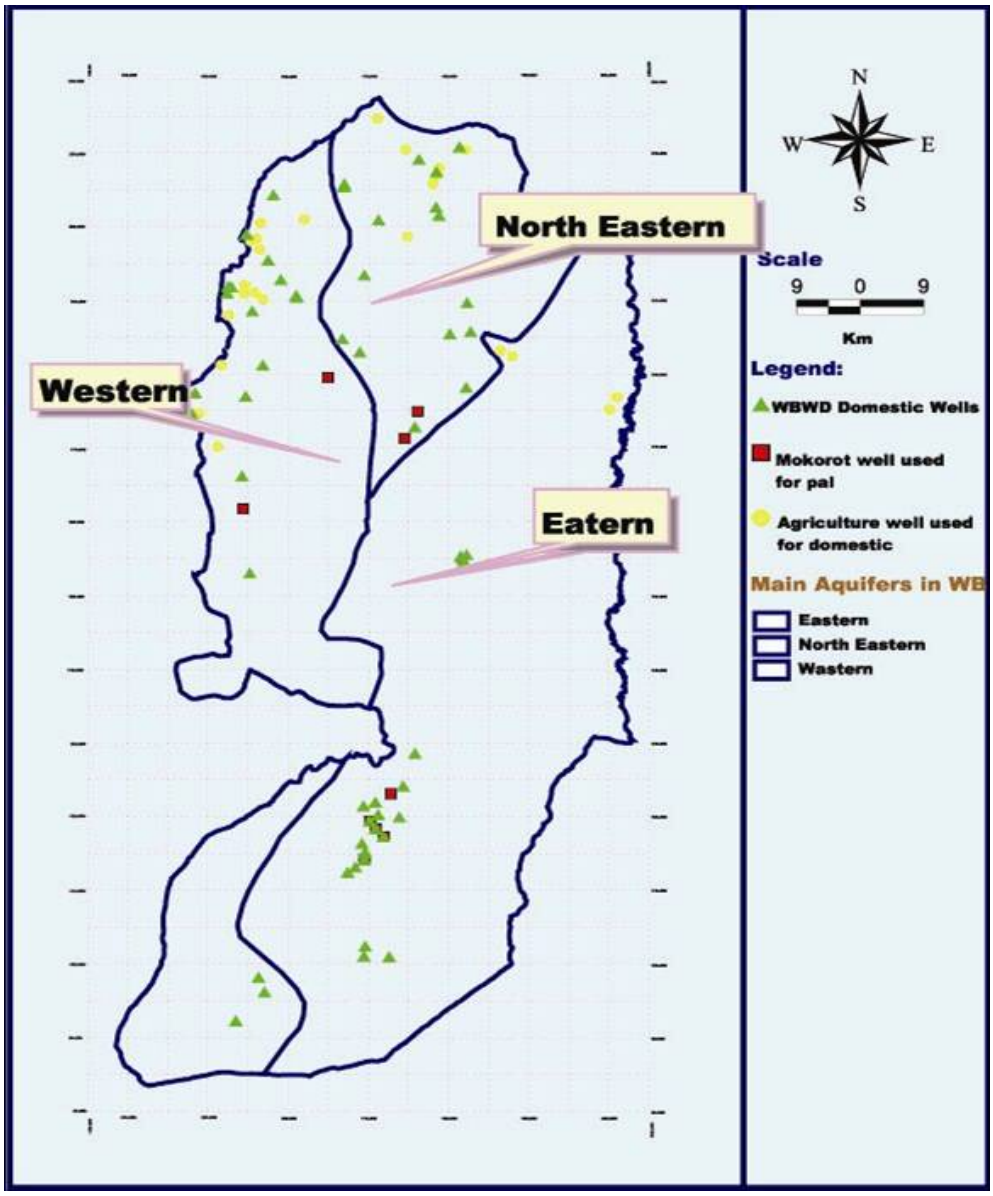

Fig 2.3: West Bank aquifers, PWA,(2006)

2.4.1. The Western Aquifer basin:

The Western Aquifer basin, which is the largest, and the most important has more than 73% of its recharge area(1767.39 km) lies in West Bank and flows westward into Israeli territory(PWA, 2006). the western basin's annual renewable yield is 365 Mm3 and has a safe yield of 365 MCM per year.

Israel exploits most of the water of this aquifer through more than 500 deep groundwater wells inside Israel and 4 wells in the West Bank, while the Palestinians pump their water from 134 wells with annual yield of 21 MCM. Israel limits Palestinian use from this aquifer to only 22 MCM per year. The total number of springs of this basin in the West Bank is 48 springs with a total annual flow is 1.9 MCM while in year 2004 the total flow was 205 MCM

2.4.2. The Northeastern Aquifer system:

The V-shaped Northeastern basin is the second largest basin with most of the basin, water originates from rain fall in the West Bank and flow north and north east into Israeli territory (Alatout,2000). This aquifer lie in the northern parts of the West Bank the recharge area of this aquifer in the West Bank is 981.08 km. The annual recharge of this basin is 145 MCM of which 82% from the West Bank. It has an annual safe yield of 145 MCM: Israel utilizes 103 MCM per year, and limits Palestinian use to 42 MCM per year; Palestinians have 76 wells tapping this basin.

2.4.3. The Eastern Aquifer system

Water from this basin flows eastward and discharges into the Jordan river and the dead sea. It has a safe yield of 100-150 MCM per year . It lies entirely within the West Bank and, until 1967, was used exclusively by the Palestinians. After the 1967 war, Israel expanded its control over this aquifer and began to tap it, mainly to supply Israeli settlements. Israel extracts 40 MCM per year from this source, and limits Palestinian extraction to 54 MCM per year. The most important springs in the West Bank belong to this aquifer. The total number of springs with average discharge greater than0.1 L/S IS 79 is 79 which participates in 90% of the total annual spring discharge in the West Bank (Jad Issac,1994)

2.4.4. Coastal Aquifer

The coastal aquifer lies underneath the Mediterranean seashore in Israel and Gaza between Rafah and Mount Carmel and has an estimated water potential of approximately 250 MCM per year. The approximate area of the entire aquifer is 2200 km2, with 400 km2 beneath Gaza. The section that underlies Gaza is largely independent of the remaining Israeli portion due to the East-West direction of water flows in the aquifer. The Israeli section has been regularly over pumped in the past and is currently being pumped at slightly over the renewable annual yield. The difference is being made up by recharging the aquifer with recycled wastewater and water from the National Water Carrier. However, excessive and continuous mining of the aquifer has caused falling water tables and ensuing salt intrusion from the adjacent Mediterranean.

Estimates place the sustainable supply of the Gaza aquifer at around 55-65 MCM per year(Tahal,1990); however, total well output amounts to 120 MCM per year, twice the safe

yield. Given the current extraction rates, some experts estimate that it will take over 100 years of zero extraction to restore pre-1948 conditions. The table below (2.4) shows the water resources and use in Palestine

Table 2.4 water resources and use (PWA, 2006)

Water Resources	Annual Recharge	Israeli Water Use	Settlement Water Use	Palestinian Water Use	Total Water Use
Mountain Aquifer					
Western	362	344	10	22	376
Northeastern	145	103	5	30	138
Eastern	172	40	35-50	69	144-159
Coastal Aquifer	250	260	0	0	260
Gaza	55	0	5-10	110	120
Jordan River	1311	685	10-20	0	1334-1340
Wastewater	450	450	0	0	450

In Gaza, some 2,200 wells tap its shallow coastal aquifer. In the past, this aquifer was partially re-charged from the Wadi Gaza that flows during the winter from Hebron, but Israel stopped its flow. The Gaza coastal aquifer has an annual safe yield of 55 MCM, but is currently being over-pumped at the rate of 120 MCM per year. Israeli settlers in Gaza are extracting 10 MCM annually from the few freshwater lenses in this aquifer. Water quality in Gaza is deteriorating rapidly due to seawater intrusion, wastewater pollution, and agricultural water return flows.

According to PWA the table below illustrates the extracted water quantities from groundwater basins in West Bank during 2003-2004.

Table 2.5 illustrates water pumped from Palestinian wells 2003-2004 (PWA, 2006)

Aquifer	Year	Domestic	Domestic WBWD	Agricultural	Total 2003	Total 2004
Eastern	2003	6.26	6.5	11.1	23.96	26.6
	2004	6.6	6.66	12.1		
North-eastern	2003	2.7	6.8	4.7	14.2	16.3
	2004	3.3	7.9	5.1		
Western	2003	0.4	6.3	14.45	21.15	22.9
	2004	0.6	6.5	15.8		

2.4.5. (Springs):

The flow of the fresh water springs is diverted mainly for irrigation and in some cases for domestic use..

The average annual flow of the fresh water springs is between 50-60 MCM However, the total annual flow of all the springs varies with the amount of rainfall that falls during the winter season.

The total annual water abstraction and utilization from surface water (springs) in the years 2004-2003 is shown below (Table 2.6).

Table 2.6: illustrates water abstraction from sprigs during the years 2003,2004 (PWA 2006).

Governorate	2003	2004
Bethlehem	1.23	0.67
Hebron	0.34	0.29
Jenin	0.27	0.22
Jericho	30.99	31.4
Jerusalem	3.51	2.89
Nablus	11.27	8.49
Qalqilieh	0	0
Ramallah	2.04	1.45
Salfit	.34	0.3
Tubas	10.54	7.01
Tulkarem	0	0
Total	**60.53**	**52.72**

2.5 Water Indicators, 2004

Table (2.7) illustrates Water Indicators. PCBS, Water Statistics in the Palestinian Territory 1998-2004; Fig.s from the Palestinian Water Authority.

Table 2.7: Water Indicators, 2004 (PCBS ,2004)

Water indicator	WB	GS	WBGS
Annual Available Water Quantity (million m^3/year)	150.9	144.8	295.8
Annual Pumped Quantity from Groundwater Wells (million m^3/year)	55.0	141.1	196.1
• for agricultural use	30,1	75,0	105.1
• for domestic use:	24.9	66.1	91.0
No. of wells	287	4,105	4,392
• for agricultural use:	248	4,000	4,248
• for domestic use:	39	105	144
Annual Discharge of Springs Water (million m^3/year)	52.7	---	52.7
Annual Quantity of Water Purchased from Israeli Water Company (Mekorot) (million m^3/year)[1]	43.2	3.7	46.9
Annual Quantity of Water Supply for Domestic Sector (million m^3/year)	73.02	69.83	142.85
from wells:	24.90	66.09	90.99
• from agric. wells:	3.91	---	3.91
• from springs:	5.40	---	5.40
• purchased[1]:	38.81	3.74	42.55
Daily allocation per capita (domestic sector) (liter/capita/day)	97.3	143.0	107.5

Chapter three

Jenin Governorate

3.1. Background

Jenin Governorate (Appendix 3.1) is one of the eleven governorates of the West Bank; it is located in the centre of Palestine, and in the north of the West Bank. It is bounded by Tubas District and the Jordan valley from the east , Nablus from south , Tulkarem from south west , the red line (1948 cease- fire) from the north and north west.

The area of the Jenin Governorate in 1948 was 835214 Km^2 but after 1948 war the area was reduced to 592 Km^2 which means that 243214 Km^2 wer taken by Israeli military forces (Al-Dabbagh,1999), with a population of 233,000 people that are living in 13 municipalities, 68 local councils and 3 project committees .Jenin overlooks both the Jordan Valley to the east and the Marj Ibn Amer(one of the most fertile lands in the arab world) to the north enjoys a strategic position on the road between Nazareth and Jerusalem, and also it is located on the Arab travelers road between Egypt and Syria ,Jesus is said to have passed by Jenin several times on his way from Nazareth to Jerusalem.

The fifth holiest Christian place and the third oldest church is located in Burqin village in Jenin governorate, it is known as St. George's church. Jenin or Einganim was mentioned in the Bible as a beautiful city with abundant water supplies, springs and gardens.
In 1948 war many Palestinians were expelled from there native villages and towns in the area, many settle led in Jenin area.

Like all Palestinians wells groundwater wells in Jenin area were placed under Israeli direct control, those which are considered Palestinian wells are shallow with a limited discharge. For this reason, many illegal wells have been excavated, especial in the agriculture land.

Many historic battles happened in Jenin area like Hettine and Ein Jalout battles, also Jenin has in important role in Palestine history since 1936 revolution began from Jenin. Jenin has long been a centre of Israeli –Palestinian conflict.

3.2 Geography

Jenin is located in the north part of the West Bank ,it is located between 95m height above sea level at Marj Iben Amer south of Moqibleh village at the 1948 line and 750 m above sea level at Jabal Hureish nea Jabea village in the south of Jenin district.

The total area of Jenin governorate is 592 Km^2 north of Jenin is the fertile plain Marj Iben Amer and south and west of Jenin is a hilly countryside with olive orchards

3.3 Demography

According to projections based on a 1997 census, The population of the entire Jenin district is over 250,000 people that are living in 13 municipalities, 68 local councils and 3 project committees in addition to Jenin camp, the city of Jenin has a population of 34,000 Palestinians. The Jenin refugee camp houses approximately 13,000 refugees, according to UNRWA (United Nations Relief and Works Agency) on 373 dunams (373,000 m²).

The majority of the population residing in Jenin (mid-2006) is Palestinian Arab . In Jenin refugees comprise approximately one-quarter of the total population The average density of the Palestinian population is 431 persons per sq. km The population is a young population. Nearly half of the total population is under the age of 15 years the annual growth rate of the population was 3.4 per cent in 2004 (PCBS, 2005). The overwhelming majority of population is Muslims. The remaining Palestinian population is Christian.

3.4 Local Government in Jenin Governorate

The Palestinian National Authority established The Ministry of Local Government on 25 May, 1994 upon the handing over of authority by the Israeli occupation. The Local Government consists of a dual structure that consists of regional branches of the Ministry of Local Government and Local Governments that is eventually supposed to be locally elected. in each governorate.

There is an office of the Ministry of Local Government, headed by a Director-General. The Director-General is appointed by The president of the Palestinian National Authority according to the Local Government Minister's recommendation. the Director-General has extensive authorities to monitor the municipalities within his district and to handle local affairs. This authority extends to aspects of local administration and allows for the Director General to decide on how to address issues on behalf of the municipalities where these authorities were not granted to the municipalities themselves. Local councils operates under the Ministry of Local Government. The most important responsibilities of local government are the management of electricity and water supply and distribution. Their range of responsibilities also includes: administration of local building permits; regulation of local markets and businesses; and sanitation and refuse collection

Municipalities are divided into three categories these categories are A, B, C (Table 3.1). Category A includes 1 municipality that is the main city in the governorate. The number of members in the council of this municipality is 15, including the mayor. Category B includes other municipalities whose population is above 8,000 like Yamoon. In addition to municipalities that normally existed for a long time (prior to 1967) like Qabatia, Arraba, Yabbad. The number of the council members in municipalities of this type is 15, including the Mayor. Category C includes 7 municipalities, Seelet Al Harthia, Seelet Al Ddaher Al Zababdeh Mithaloon Kofr Raee Jabea.

These are municipalities established by the Palestinian Authority with a population of between 4,000 and 8,000 persons.. Village Councils of population between 1000 and 4000, Locality whose population is less than 1,000 persons are called “Local Development Committees”.(Abdulnasser,Makky,2004)

Table 3.1: Municipal Organization in Jenin,2005 (,Makky, 2004).

Municipal Classification	Number	Population Size	Number of Council members
Municipality A	1	40000	15 (center of Governorates)
Municipality B	4	8,000 +	13 (former municipalities)
Municipality C	7	4,000 - 8,000	11 (Newly established Municipalities)
Village Council	28	1,000-5000	7
Local Development Committee	51	Less than 1000	7
Total	91		

3.5 Population of Jenin Governorate

The total population number of Jenin Governorate in the year 1997 was 195299 people.

Table 3.2. Palestinian population in Jenin Governorate (PNIC,1997).

	Males	Females	Both Sexes
Urban Area	28962	37721	76683
Rural Area	55992	53514	109506
Camps	4537	4573	9110
Total	99491	95808	195299

3.6.Agriculture in Jenin

Jenin Governorate is an agricultural area with over 580,000 dunums of fertile, high quality soil that produce considerable harvests. The agricultural sector of the Jenin Governorate contributes 30% of the Palestinian National Income, and supplies work for 25% of the Palestinian population as farmers (PNIC, 1997). The area of agricultural lands in Jenin is about 367415 donums (20% of the total area of Palestinian farmed lands). Details about agriculture in Jenin is presented below:

- Type and area of plantations and method of plantation in Jenin Governorate: The area of farmed lands in the governorate reached about 367415 donums in 1997/8 (about 20% of area of total farmed lands in the Palestinian lands; about 354526 donums produced rain-fed plantations and the rest area produced irrigated plantations). Fruits occupy the biggest production area in the governorate, which reached about 215140 donums (about 58% of the area of farmed land in the governorate).

- Value of Plant Production in Jenin Governorate: The total production value in the governorate reached about 100.580 million dollars (about 16.4% of total plant production in the Palestinian lands, which reached 611.248 in the same year(PNIC.1997).

- Firstly: Fruit Trees: The production amount of fruits reached about 42890 tons in 1997/8 . The financial value of this product was about 69.860 million dollars.
- Vegetables: The production amount of vegetables in 1997/8 reached about 46903 tons (about 37.3% of total vegetable production in the Palestinian lands, which was 17.320 million dollars in the same year).
- Field Crops: The production amount of field crops in the Governorate in 1997/8 reached about 35713 tons with a value of 13.400 thousand dollars (about 28.4% of production value of field crops in the Palestinian lands, which was 56.140 million dollars).

3.7 Animal Production in Jenin Governorate

The Jenin Governorate raises sufficient quantities of cows, goats, sheep and chickens but due to lack of processing industry these cannot be fully exploited and imports remain necessary to fulfill local demand.

The animal production value in Jenin Governorate in 1997/8 reached about 37.456 million dollars (about 10.9% of total animal production value in Palestinian lands, which was 342.369 million dollars). This value was divided among the following types:

3.8. Israeli Settlements in Jenin Area

Israel built many settlements in Jenin area later in 2006 Israel withdraw from four settlements and one military post these settlements are:

- Ganim settlement: It is situated in the eastern part of Jenin city. To the north it is bordered by 'Aba village and Al-Almaniya are of Jenin city, to the east by the town of Deir Abu D'eef, to the south by Um-at-Tut village and Khirbit Sab'aeen, and to the west by Qadim settlement and Jenin city and As-Sweitat area.

- Qadim settlement: It is close to Ganim settlement. It is surrounded by 'Aaba village to the east and Al-Almaniya area of Jenin City to the north. It was established on the government land and countryside in 1981. Its area is about 166 donums. It is issued for civil purposes and it is officially linked to 'Afula.

- Sanur settlement: It lies on the main road of Jenin-Nablus near 'Aja, Sa Nur and Jaba' villages. It's about 77 donums. It has an old building known as "Al-Muqata'a" and an old mosque which was transformed into a synagogue.

- Homesh settlement: It is situated to the south east of Silat ad-Daher village. It has a distinct geographical site due to its height on Al-A'teibat Mountain. It's about 680 meters above sea level. It is built on a government land connected to Silat Ad-Daher village. Its area is about 1000 square meters. It was established in 1978. It is connected to Jenin-Nablus main road by one kilometer branch roads.

- Arraba Military Post: It is located near Mevo Dotan settlement and it is issued for military purposes. Other settlements like the Reyhan-Dotan Bloc which lies in western part of Jenin adjacent to the Green Line (by Wadi ‘Ara) like Rikhan, Hinnanit, Talmenashe, Shaqed, Hermesh, Mevo Dotan still exist.

3.9. Barrier wall impacts on land, jobs, in Jenin area

Due to the wall's route, the Western aquifer lie on the west side of the wall, giving Israel access to West Bank groundwater supplies. while leaving Palestinians with less water Prior to the current intifada, Jenin towns and villages fared relatively well economically compared to other West Bank localities, due to easy access to the Israeli labour and consumer markets and because large numbers of Israelis, especially Israeli Arabs, visited Jenin. Access to the Israel labour market has virtually disappeared in the last years and Israeli citizens are not allowed to enter areas under Palestinian Authority control. The barrier sealed the end of Palestinian migrant labour in Israel while also isolating affected communities from each other, compounding acute unemployment and poverty levels.

3.10 Water distribution services for domestic and drinking purposes in Jenin Governorate

According to Palestinian Central Bureau of Statistics (PNIC, 1997) ,the total number of population of Jenin Governorate is estimated to be approximately 254218 inhabitants. The population is distributed over 91 communities, including cities, towns, villages, refugee camp; small communities (kherbeh).

Jenin city and Jenin camp, in addition to many big villages and towns have water distribution networks, other communities and villages have water networks in part, while there are small communities without water service at all. Administratively Jenin Governorate is divided into 91 communities with different number of population; rate and level of water services and availability of water resources, Table (3.4) below illustrate the served and unserved communities and population

Table 3.3: illustrate the served and unserved communities and population in Jenin area (PWA, 2006).

Governorate	**population**			**Communities**		
	Total	Served	Unserved	No	Served	Unserved
Jenin	254218	208928	45290	91	52	39

There are 39 localities in Jenin area unserved and still without water networks with a total population of 45290 people, table 3.5 shows unserved communities in Jenin area in 2005

3.11 Drinking water supply resources

Drinking water resources in Jenin area are either from local resources like groundwater wells and springs which is managed by municipalities or village councils or Joint Services Council (JSC) or purchased from Israeli Water Company (Mekorot) which is distributed by West Bank Water Department(WBWD).

According to PWA water supply report in 2005 the total water quantities purchased in 2005 from Mekorot in Jenin area was 2.7 million cubic meter ,while the water quantities abstracted from local resources was 2.069 million cubic meter , Table (3.5) below show the total local and purchased water in 2005

Table 3.4: Unserved communities in Jenin area (PWA, 2005).

No.	Locality	Population
1	'Arabbuna	830
2	As Sa'aida	128
3	'Arrana	2083
4	Faqqu'a	3390
5	Khirbet Abu 'Anqar	15
6	Khirbet Suruj	48
7	Barghasha	75
8	Mashru' Beit Qad	376
9	Al Jameelat	36
10	Beit Qad	847
11	Umm Qabub	94
12	Khirbet al Muntar al Gharbiya	34
13	Jalbun	2421
14	'Aba	170
15	Khirbet Mas'ud	63
16	Deir Abu Da'if	5140
17	Umm Dar	566
18	Al Khuljan	473
19	Wad ad Dabi'	521
20	Dhaher al 'Abed	361
21	Zabda	807
22	Al Manshiya	155
23	'Arab as Suweitat	488
24	Khirbet Sab'ein	30
25	Imreiha	414
26	Al Mutilla	255
27	Bir al Basha	1269
28	Al Hafira	79
29	Ad Damayra	288
30	Raba	2951
31	Misliya	2187
32	Al Jarba	73
33	Al Kufeir	67
34	Sir	747
35	Meithalun	6804
36	Mantiqat al Heish	26
37	Al Jadida	4738
38	Al 'Attara	1041
39	Siris	4898

Table 3.5: water resources purchased and developed and supply rate (PWA,2005)

Governorate	Population	Water abstracted	Water purchased	Total Resources	Supply Rate L/c/d
Jenin	254218	2.069	2.7	4.769	52

3.11.1. Local resources for supply of drinking water:

The local water resources in Jenin area consist of four wells in addition to springs and agricultural wells as shown in Table (3.6) and Table (3.7) below.

Table 3.6: local water resources (PWA, 2005)

Governorate	Municipal wells (MCM)	Domestic springs (MCM)	Agricultural wells (MCM)	Total (MCM)
Jenin	1.551	0.12	0.398	2.069

Table 3.7: Municipal wells in Jenin area and water production (PWA, 2005)

Well Code	Owned by	Production (MCM)	Total (MCM)
17-20/051J	Jenin Municipality, Joint Water Council	0.967	1.551
17-20/033J	Jenin Municipality	0	
17-20/052Q	Qabatia Municipality	0.584	
16-20/006	Ya'bad municipality	0	

3.12 Agricultural wells in Jenin Governorate

Many communities in Jenin Governorate which don't have water resources have to rely on water from the agricultural wells. These communities are located where there are agricultural wells, like Deir Ghazaleh, On the other hand, in Qabatia and in the Joint Services Council of Jenin Western villages and the agricultural wells are used as an additional resource for supplying drinking water in summer.

They purchase additional quantities of agricultural water to supply there customers in summer due to the shortage in the drinking water. These municipalities include, Qabateyeh and the Joint Services Council for Jenin Western Villages. Table (3.8) shows the productivity of these wells:

Table 3.8: Agricultural wells used to supply potable water to customers(PWA,2005)

Agriculture Wells Used for domestic supply			
Well Code	Locality	Production (MCM)	Total (MCM)
18-21/003	Deir Ghazaleh	(م)0.03	0.398
17-20/030Q	Qabatiya	0.079	
18-21/035	Joint Water Council	0.289	

3.13 Springs utilized for drinking purposes

A group of springs (Table 3.9) which's water is valid for drinking. Such quantities of water are utilized to supply the networks with water. They are considered as main resource of water in some communities, Barta'a, Khirbet 'Abdullah Al Yunis Khirbey Ash sheikh Sa'id .

Table 3.9: Supplied water from the domestic springs in Jenin Governorate (PWA,2005)

Spring Code	Locality	Production (MCM)	Total (MCM)
BA/066	Barta'ah Ash sharqiya	0.12	0.12
	Khirbet 'Abdullah Al Yunis		
	Khirbey Ash sheikh Sa'id		

3.14 Purchased resources

Resources purchased from the Israeli Water Company "Mekorot" and distributed through the West Bank Water Department "WBWD" and reached in total in 2005 (2.7) million cubic meters (Table 3.10). These quantities originate from three main resources, namely the West Bank Water Department wells, the Israeli Water Company wells within the Green Line and the Israeli wells drilled in the West Bank. These wells are Palestinian wells under the Israeli control and operated by the West Bank Water Department. Israel took control over these wells at the end of 1970s, when Israel annexed such wells to Mekorot Company.).

Table 3: 10: Water purchased From Mekorot in Jenin Governorate.

WBWD Wells	Inside West Bank	Outside West Bank	Total With Settlements	settlements	Net For Palestinian
2.071	0.286	0.387	2.744	0.044	2.7

The Purchased Water Resources are distributed as follows: West Bank Water Department Wells: The wells directly supervised by the West Bank Water Department and managed and maintained by Mekorot Company. These are 13 wells, of which 12 wells are operational after the breakdown of Al Zaweya wells (1998) and re-operation of Al Riheyeh wells after their breakdown in (2001) and Herodion Well 5 after breakdown in (2003). The wells currently produce 10.4 million cubic meters, at a slight increase over the past three years. Table (3.11) shows these wells with its production quantities for the current year.

Table 3.11: West Bank Water Department Wells (PWA, 2006).

Well	Governorate	Production MCM	Total MCM
Qabatiya	Jenin	0.536	2.071
Arrabah		0.403	
Sanur		1.132	

3.15 Water Supply Management in the West Bank

Municipal and local councils and joint services councils has its own water resources; some have local resources like ground water wells or springs. In some cases, these resources are not sufficient to meet the increasing demand. Therefore, these institutions purchase large part of its water from the Israeli Water Company through the West Bank Water Department or from the agricultural wells purchased or leased for the purpose of water supply. The tables below include all communities that have water networks in Jenin governorate, where they have been distributed by water supplier and resource of supply.

3.15.1. Water supply management in Jenin:

Table (3.12) illustrate the water supply in the communities in Jenin governorate (PWA, 2006)

Table 3.12: Water supply in the communities in Jenin governorate (PWA, 2006)

Supply Utility	Communities		Population
	Names	No.	
WBWD	Talfeet, Taneen, Galqamus, Umm Al Tut, Al Mughayer, Al Zababdeh, Qabatia, Al Shuhada', Burqin, Marka, Al Zawya, 'Anza, 'Ajja, Al Rama, Kufr Ra'I, Fahma, Nazlet Al Sheikh Zeid, Al Turm, Tura Al Gharbiya, Tura Al Sharqiya, Ya'bad, Kafreet, 'Arraba, Jaba', Seilat Al Dahir, Alfundaqawmiya, Sanur, AL Jalama, Umm Al Rayhan, Dahr Al Malih, Wadi Al Da'uk, Al Mansura, Al 'asa'sa	32	77751
Municipal Wells	Jenin city, Jenin camp, Dahiyat Sabah El Khair, Al Yamun, Seilat al Harithaya, Kufr Qud, Al Hashimia, Al 'araka, 'Anin, Al Tayba, Rummana, Zububa, Ta'nek, Kufr Dan	16	126785
Agricultural Wells	Deir Ghazaleh	1	829
Springs	Barta'a Al Sharqiya, Kherbet Al Sheikh Said, Kherbet Abdullah Al Yunis	3	3848
Un-Served	'Arabbuna, As Sa'aida, 'Arrana, Khirbet abu 'anqar, Khirbet suruj, barghasha, Mashru' Beit Qad, Al Jameelat, Beit Qad, Umm Qabub, Khirbet al muntar, Jalbun, 'Aba, Khirbet Mas'ud, Deir abu da'if, umm Dar, al Khuljan, Wad ad Dabi', Dhaher al 'Abed, Zabda, Al Manshiya, 'Arab as suweitat, khirbet Sab'ein, Imreiha, Al Mutilla, Bir al Basha, al hafira, Ad damayra, Raba, Misilya, Al Jarba, Al Kufeir, sir, Meithalun, Mantiqat al Heish, al Jadida, Al "attara, Siris	39	44987

3.15.2. Economic situation:

The Palestinian economy had lived under the Israeli occupation , and had been made complimentary and dependent on the Israeli economy. Through the years of military occupation, Israel has created in Palestine an economy dependent on its own economy. The main cause of economic decline in the Occupied Palestinian Territories has, however, been the policy of curfews and closure instituted by Israel. There are varying degrees of closure in different Palestinian areas at different times. Closures limit the movement of people and vehicles, as well as any goods. In addition, the Palestinian economy has been severely affected as a result of the Gulf War.

3.15.3. Labour flows to Israel:

Before the current Intifada, Israelis were the largest employers of Palestinians, more than one-third of the Palestinian labour force (116,000)Palestinians were working in Israel. Despite most of these Palestinians were employed in low-skill, manual labor jobs in construction, agriculture and services The income from Palestinian employment in Israel contributed directly to about twenty percent of [Gross National Product].

Since the beginning of the Intifada, Israel's implementation of stricter closure policies, coupled with its recruitment of foreign workers, has resulted in a major decline in the numbers of Palestinian workers allowed into Israel ,this results in dramatic rise in poverty to Palestinian Governorates especially Jenin (PECDAR , 2004).

According to Pecdar Palestinian wages in Israel were up to two-and-a-half times greater than the average pay in West Bank and Gaza. In 2003, average daily wages in the Gaza Strip were about 12 US $ and about 15.80 US $ in the West Bank in comparison to 29 US $ for Palestinians working in Israel.361 This is especially troubling since despite the disparity in wages, much of the goods in the Palestinian territories are imported from Israel and are therefore set at high prices. These burdensome costs has undoubtedly force more Palestinians to seek humanitarian aid

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Chapter Four

Methodology

4.1. Introduction

In managing water service many factors should be taken into consideration, as institutional settings and legal framework, environmental sustainability, water scarcity and financial means for operating, maintaining and developing water infrastructure. Any community needs adequate supplies of clean water for domestic consumption, commercial and industrial development, and agriculture. But in Palestine local government municipalities and councils have limited water supplies Palestinians have very low consumption rate(only half the minimum amount of domestic water per person established by the World Health Organization) **.** The situation of local water supply in most communities connected to water networks in Jenin governorate is poorly developed and not up to standard, due to political instability, and inadequate sources of funding. Also the poor state of the water service conducted by municipalities and village councils in Jenin area is largely due to water scarcity.

In summer when the water supply is irregular people of these communities have to rely on:

- Untreated water from springs
- Purchased delivery of untreated water by tankers
- Untreated rainwater collected in cesterns during rainy winter months

Most of municipalities and village councils are over staffed, poorly managed, and inefficient. Poor planning, lack of appropriate maintenance, use of low quality materials and equipment, combined with the bad economic situation (The bad economic situation in governorate during the Intifada has prevented many customers from paying their water bills). are responsible of the poor state of repair of the infrastructure in most municipalities.

This chapter covers the procedure as well as the instruments used to carry out the research. It also describes the water service level in the Jenin area where the research was conducted, the research design, the statistical method used in analyzing the results of the research. The aim of this study is to study and overview the current level of water service conducting through local government institutions.

4.2. Water service

Water service is the process of providing drinking water to residential, public, commercial and industrial customers as well as for fire fighting, usually through piped systems (water networks). Details related to water services are presented below (PWA, 2006):

- History of water service: Early Rome had a system of aqueducts and pipes that terminated in homes and at public wells and fountains for people to use.
- Water and health: Quality of water is essential for public health. Quantity of water is also essential since The World Health Organization has defined around 20 liter per capita per day as basic access, which implies high health concerns, and 100 liter per capita per day as optimal access, associated with low health concerns. Again according to USAID" water quality is not being tested in the Palestinian villages and much of the household water is untreated"
- Service quality: Palestinians people having access to piped water receive a poor or very poor quality of service,. Water supply service quality has many dimensions: continuity; water quality; pressure; and the degree of responsiveness of service providers to customer complaints.
- Continuity of supply: Continuity of water supply is a severe problem in many developing countries like Palestine, where sometimes water is only provided for a few hours every day or a few days a week. It is estimated that about half of the population of developing countries receives water on an intermittent basis.
- Water quality: Drinking water quality has a micro-biological and a physico-chemical dimension. There are thousands of parameters of water quality. In public water supply systems water should, at a minimum, be disinfected - usually through
- Water pressure: Pressure in an urban water networks should be maintained either by pumping the water up into a reservoir and relying on gravity to maintain a constant pressure in the system or solely by pumps at the water treatment plant and repeater pumping stations.
- Comparing the performance of water and sanitation service providers: Comparing the performance of water service providers (utilities) is needed, because the water sector in Palestine offers limited scope for direct competition. Benchmarking the performance of utilities allows simulating competition, establishing realistic targets for improvement and creating pressure to catch up with better utilities.
- Service provision: Water supply service providers, which are often municipalities, differ from each other in terms of their geographical coverage relative to administrative boundaries; their sectoral coverage.
- Geographical coverage: Many water utilities provide services in a single village, town or municipality.. In rural areas, water services are often provided by village councils, or by Committee which usually cover one village.
- Sector coverage: Joint Service Council for water in Jenin western villages provide only water supply services,. However, in most cases municipalities also provide electricity and water services. Utilities that provide water, sanitation and electricity can be found only in Jenin Municipality.
- Tariffs: Municipalities charge tariffs to recover all or part of their costs. Water tariffs can take many different forms. Where meters are installed, tariffs are typically volumetric (per usage), sometimes combined with a small monthly fixed charge. Metering is considered good practice in water supply and is widespread in developed countries, it allows to charge for water based on use, also it allows a utility to better locate distribution losses.
- Costs and financing: The cost of supplying water consists to a very large extent of fixed costs (capital costs and personnel costs) and only to a small extent of variable costs that depend on the amount of water consumed (mainly energy and chemicals). usually, only part of these costs is usually billed to customers, the remainder being financed through direct or indirect subsidies from local, regional or national governments

4.3 Research design

The research uses The International Benchmarking Network for Water and Sanitation Utilities(IBNET**)** performance indicators to study the current performance levels for water service conducted through local government municipalities and councils in Jenin governorate

4.4 Research objectives

The objectives of the study are to:

- summarize pertinent facts and Fig.s on the general business and operational environments of water service providers in Jenin area.
- discuss performance of the different providers against key statistical and performance indicators.
- provide a comparative view of performance in the crucial areas of water supply and rating the municipalities relative to each other against this indicator.
- Acquire adequate understanding of management and institutional aspects of water services delivery in an evolving and challenging environment.

The aim of this study is to overview the current situation of water service conducted by local government institutions in Jenin governorate in a step of integrating the information between local government institutions with the aim of improving the water service in these institutions

4.5 Target institutions

The institutions studied in this research are all the municipalities and village councils that is responsible for supplying domestic water in Jenin governorate they are distributed to 20 councils. Table (4.1-a) and Table (4.1-b) below shows these municipalities and village councils and their population

Table 4.1-a: Served communities with their populations

Name	population	type
Jenin municipality	48003	Municipality(A)
Joint Service Council	46880	Joint Service Council
"Zububa		
Rummana		
Ti'innik		
At Tayba		
Al Yamun		
Silat al Harithiya		
'Anin		
Kafr Dan		
Al Hashimiya		
Al 'Araqa		
Kafr Qud"		

Table 4.1-b: Served communities with their populations

Name	population	type
Qabatiya	19127	Municipality (B)
Ya'bad	14014	Municipality (B)
Arraba	9703	Municipality (B)
Jaba'	8453	Municipality(C)
Kafr Ra'i	7594	Municipality(C)
Silat adh Dhahr	6079	Municipality(C)
Birqin	5730	Municipality(C)
'Ajja	4998	Village Council
Sanur	4141	Village Council
Az Zababida	3751	Municipality(C)
Barta'a ash Sharqiya	3499	Village Council
Al Fandaqumiya	3266	Village Council
Kufeirit	2376	Village Council
Fahma	2369	Village Council
Al Jalama	2238	Village Council
Al Mughayyir	2175	Village Council
'Anza	1949	Village Council
Jalqamus	1813	Village Council
Ash Shuhada	1688	Village Council
Mirka	1510	Village Council
Tura al Gharbiya	1078	Village Council
Umm at Tut	974	Village Council
Ar Rama	876	Committee
Deir Ghazala	829	Village Council
Nazlat ash Sheikh Zeid	708	Committee
Az Zawiya	682	Committee
al 'Asa'asa	453	Committee
At Tarem	387	Committee
Umm ar Rihan	363	Committee
Fahma al Jadida	340	Committee
Khirbet ash Sheikh Sa'eed	212	Committee
Dhaher al Malih	211	Committee
Tura ash Sharqiya	176	Committee
Al Mansura	146	Committee
Khirbet 'Abdallah al Yunis	137	Committee
Wadi Du'oq	121	Committee
Telfit	112	Committee
Tannin	60	Committee
Total (Table 4.1-a and 4.1-b)	209221	

As seen the municipalities and village councils responsible for water supply in Jenin governorate are six types:

- Joint Service Council
- Municipality type A

- Municipality type B
- Municipality type C

Fig. (4.1) below shows type of council and population served.

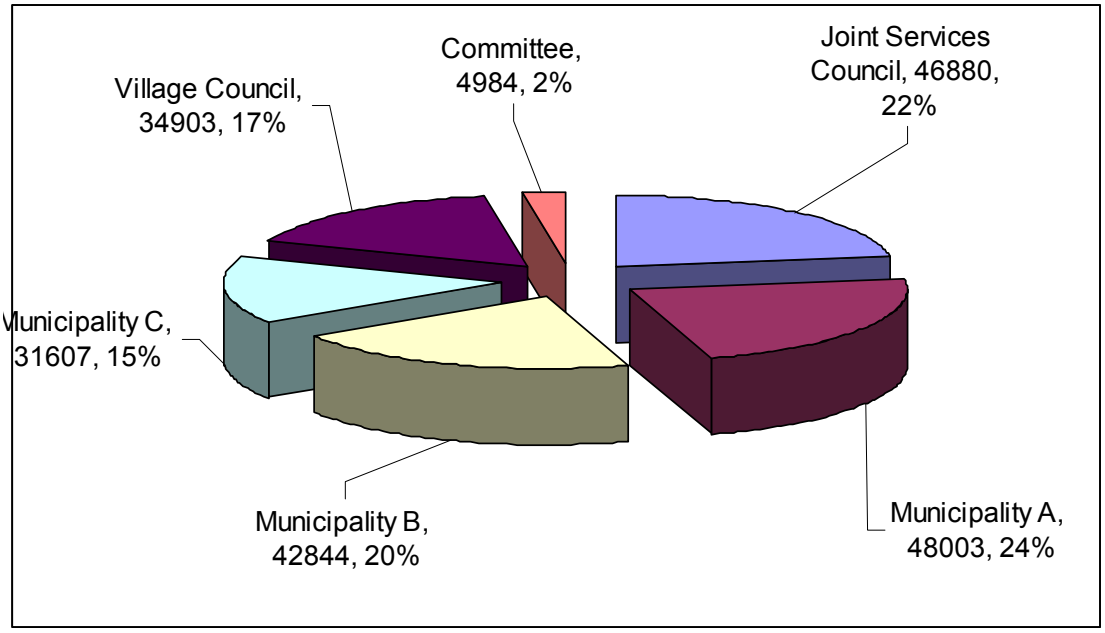

Fig 4.1 show type of council, percentage of population served

4.6 Sample of the study

The sample of the study is all the municipalities and village councils that has water departments responsible for water service which is joint service councils, municipalities type A, municipalities type B, municipalities type C, many of village councils that has any shape of water department. These councils are shown below (Table 4.2).

4.7 Research instruments

The instrument used in the research was the performance indicators survey

4.8 The field survey

Short summary is presented below about the field survey:

- The main instrument used in this research is the survey form which is mostly based on (IBNET) survey instrument with several additional questions which is developed to be used in measuring the performance indicators of water utilities in Jenin area. The questionnaire was reviewed and modified to obtain the final form appearing in Appendix (4.1 and 4.2).
- Validation of questionnaire: The draft questionnaire was reviewed by specialists in the water sector as well as by many engineers working in the water sector.
- Collection and revision of data: I had collected the filled questionnaires: .All councils responded to the questionnaire. The data was then reviewed for

consistency and reasonableness. The data presented in this research has been voluntarily provided by municipalities. Most data appear to lie within the bounds that might be realistically expected which are encouraging. For example municipalities and village councils are not reporting unachievable low levels of unaccounted for water. Also data were compared to data from(PWA) records

- Data Analysis: The data were analyzed using the software Excel. In order to take into consideration different operating environments, the data from separate councils were compared according to two different groupings:

  - by type of municipality
  - population of the council

This study will mainly focus on presenting weighted averages of the performance indicators in order to provide an overall perspective of the water sector. Whenever possible the averages will be compared to Performance Level for Jerusalem Water Undertaking and performance indicators of utilities in developing countries. For the purpose of clarity, this study will mainly focus on presenting weighted averages of the performance indicators in order to provide an overall perspective of the water sector in Jenin. Also the study provide a set of indicators, including graphs to illustrate the performance of individual utilities

Table 4.2: Municipalities and councils and population of the sample

Name	Population
Joint Service Council for water for Jenin western villages	46880
Jenin municipality	48003
Qabatiya	19127
Ya'bad	14014
Arraba	9703
Jaba'	8453
Kafr Ra'i	7594
Silat adh Dhahr	6079
Birqin	5730
'Ajja	4998
Sanur	4141
Az Zababida	3751
'Ajja	4998
Sanur	4141
Barta'a ash Sharqiya	3499
Al Fandaqumiya	3266
Kufeirit	2376
Fahma	2369
Al Jalama	2238
Al Mughayyir	2175
'Anza	1949
Jalqamus	1813
Ash Shuhada	1688

4.9 The performance indicators

The performance indicators are distributed under many categories, physical, financial, human resources and environmental performance indicators. These categories performance indicators definitions and units are shown below (Table 4.3-a) and Table (4.3-b)

Table 4.3-a: performance indicators categories, definitions and units

Category	**No**	**Indicators**	**Definition**	**Unit**
Coverage	1.1	Water Coverage	Population with access to water services (either with direct service connection or within reach of a public water point) as a percentage of the /total population under utility's nominal responsibility	%
	1.2	Water Coverage – Household Connections	Resident population served by service provider through service connection/ as a percentage of the /total resident population.	%
Water Consumption and Production	2.1	Water Production	Total annual water supplied to the distribution system (including purchased water, if any) expressed by population served per day	liters/person/ day
	2.2	Water Production	Total annual water supplied to the distribution system (including purchased water, if any) expressed by connection per month	m3/conn /month
	2.3	Total Water Consumption	Total annual water sold expressed by population served by • Population served per day • connection per month	liters/person/ day
	2.4	Total Water Consumption	Total annual water sold expressed by population served by connection per month	m3/conn /month
Non Revenue Water	3.1	Non Revenue Water	Difference between water supplied and water sold (i.e. volume of water "lost") expressed as a percentage of net water supplied	%
	3.2	Non Revenue Water	Volume of water "lost" per km of water distribution network per day	m3/km/day

Table 4.3-b: performance indicators categories, definitions and units

Category	No	Indicators	Definition	Unit
	3.3	Non Revenue Water	Volume of water "lost" per water connection per day.	m3/conn/day
Piped Network Performance	4.1	Pipe Breaks	Total number of pipe breaks per year expressed per km of the water distribution network	breaks/km/yr.
Cost and Staffing	5.1	Unit Operational Cost for Water	Annual water service operational expenses/Total annual volume sold.	N IS/m3 sold
	5.2	Staff Water /'000 Water connections	No of water Staff per thousand population served	#/'000 W pop served
	5.3	Labor Costs vs Operational Costs	Total annual labor costs (including benefits) expressed as a percentage of total annual operational costs.	%
Quality of Service	6.1	Continuity of Service	Average hours of service per day for water supply.	Hrs/day
	6.2	Quality of water supplied: nr of tests for residual chlorine	The number of tests carried out on samples taken from the distribution system, as a % of the number required by the standard that applies. This may exceed 100%.	% of # required
	6.3	Quality of water supplied: samples passing on residual chlorine	The percentage of samples tested for residual chlorine that pass the relevant standard	%
Financial Performance	7.1	Operating Cost Coverage	Total annual operational revenues/Total annual operating costs	Ratio

Chapter Five

Results and discussion

5.1 Water Supply

Water is supplied to customers in the Jenin area from different sources: WBWD, agriculture wells, springs, and municipal wells. Fig. (5.1) illustrates the numbers of people served by each source, while the number of communities, with regard to source of supply, is illustrated in Fig. (5.2) below:

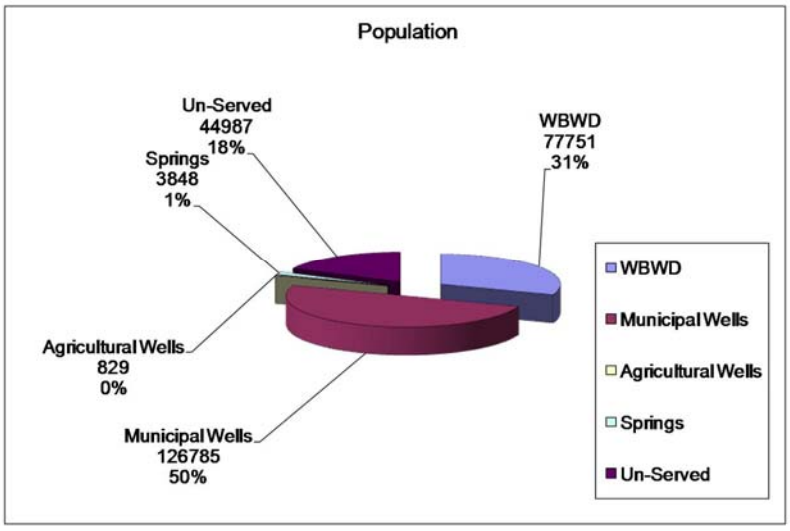

Fig. 5.1: Water sources and distribution of use. Percentages of the population serviced by the available sources of water in the Jenin area.

5.2 Methodology

Analysis of the data will, when possible, be based on two variables:

- Type:
    - Municipality A and Joint Services Council: 2 utilities
    - Municipality B: 3 municipalities
    - Municipality C and village councils: 9 councils
- Size of the municipalities:

- Group 1: volume of water sold in 2005 >130000 m3: 5 councils
- Group 2: volume of water sold in 2005 <130000 m3: 9 councils

For the comparison and whenever possible, the average for municipalities was compared:

- with practices performed by utilities in developed countries.
- with practices by the city of Jerusalem's water practices.

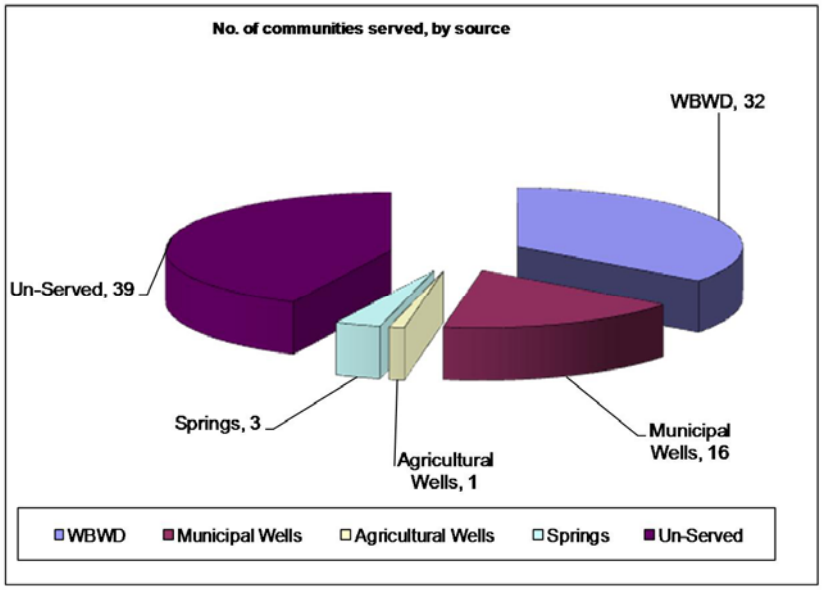

Fig. 5.2: Number of communities served in Jenin area, classified by source of supply.

5.3 Business diversity

The main function of Palestinian municipalities is to provide and manage most urban services and utilities. This includes water; electricity; waste disposal; the establishment and maintenance of schools; planning and issuance of building licenses; and, road construction and maintenance. The Joint Services Council for Water and Wastewater for is alone responsible for water service in Jenin's western villages. Wastewater services exist only in the Jenin municipality. Other towns have no wastewater disposal systems. The depicts the number of municipalities studied and types of services they provide (Table 5.1)

Table 5.1: Number of municipalities in the Jenin district and types of services provided.

Water service alone	1
All Municipal services including wastewater	1
All municipal services except wastewater	14

5.4 Service coverage:

The coverage level of each municipality or village council is calculated upon the basis of population served by the piped water network provided by the localities(house connection

or tanker filling points), and with respect to the total population under the jurisdiction of the locality. A key observation to be made is that the distribution systems reached more than 90% of the population in the councils studied in the year 2005. Table (5.2) below delineates the coverage level for the three types of municipalities and village councils for the year 2005.

Table 5.2: Municipality type and water coverage.

TYPE(A)	TYPE(B)	TYPE(C)
95.5%	93%	79%

The percentages for each type (A, B and C) are illustrated in Fig. (5.3) below

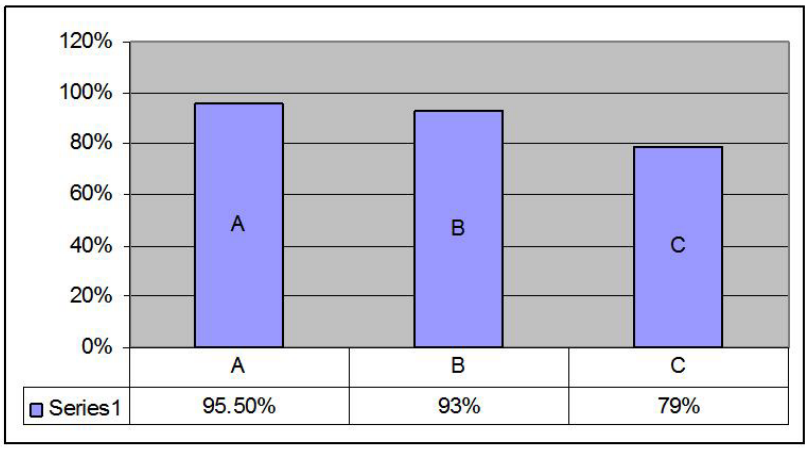

Fig. 5.3: Coverage of water in the three types of municipalities.

It must be noted that service coverage varies tremendously between major municipalities, and medium and small ones, as illustrate in Fig. (5.4) below.

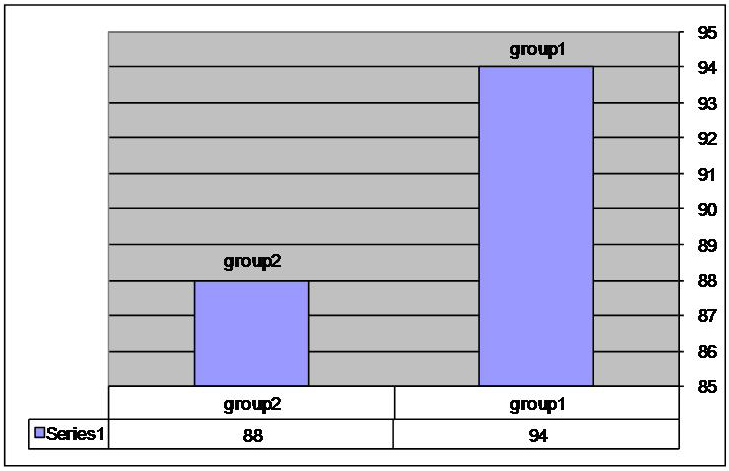

Fig. 5.4: Coverage in the two groups of municipalities.

5.5 Water unaccounted for

UFW is the amount of water that a utility produces (or purchases from other entities), minus the amount that is sold to consumers. UFW is presented as a percentage of water produced or as an amount per length of distribution system, which can be the result of losses both physical (leaks, overflow) and commercial (illegal connection, meter under-registration). The average level of UFW in the municipalities studied here is 35%. The Fig. (5.5) below illustrates the UFW in these municipalities

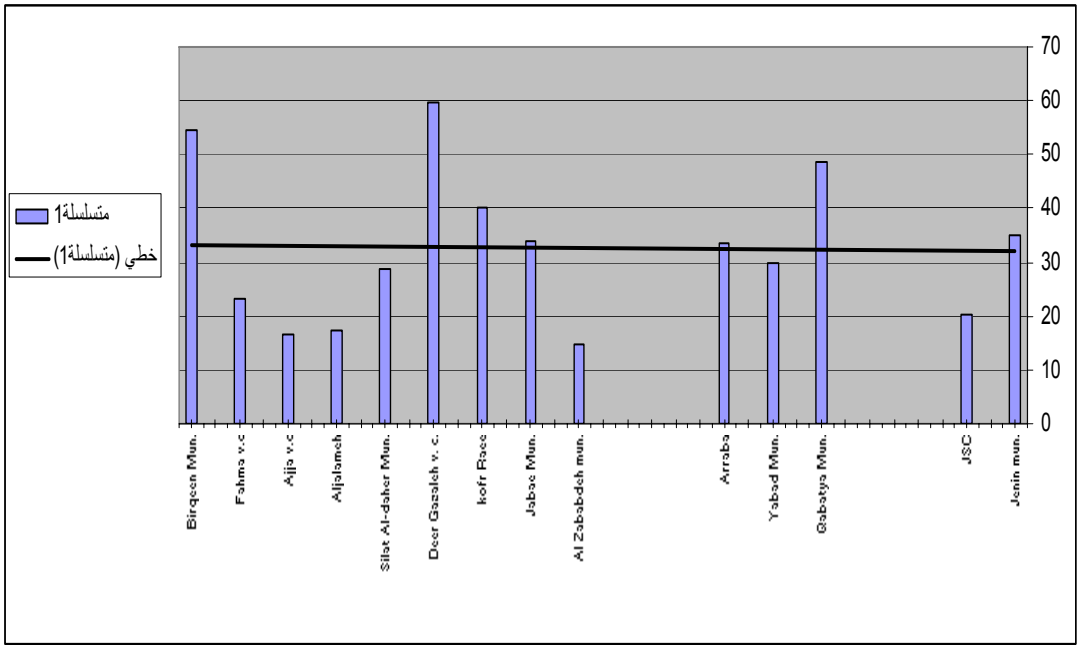

Fig. 5.5: UFW percentages in municipalities and village councils.

Comparison with well managed utilities shows that an achievable level for 23% of the developing countries is 23 % UFW; even JWU has achieved 28%. Therefore, the UFW has the potential to be reduced in order to increase the amount of water available to satisfy the currently unmet demand. The main reason for the high level of UFW in Jenin governorate is the poor condition of the water networks, which have been neglected during the period of Israeli occupation.

The low percentage of UFW from the Joint Service Council (20%) is due to the water networks being newly constructed in 1998. In Al-Zababdeh, where UFW is very low relative to other municipalities (15%), all the household water meters are installed in a box outside the dwellings and consumers have to connect their houses using these boxes. The boxes are closed and out of reach to anyone excepting municipality employees. This means that illegal connections are rendered impossible.

UFW is also expressed by the quantity of water (cubic meters) lost per one kilometer of network per day (m3/km/day). The Fig. (5.6) below shows these quantities. UFW can additionally be expressed as the quantity of water (cubic meters) lost per house connection per day (m3/conn/day). Fig. (5.7) below shows these quantities.

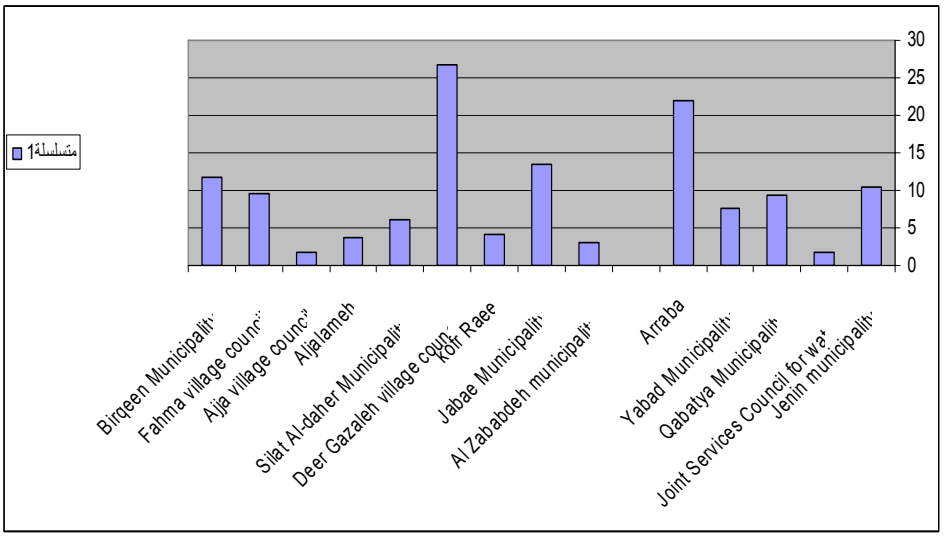

Fig. 5.6: Municipalities' UFW expressed as m3/km/day.

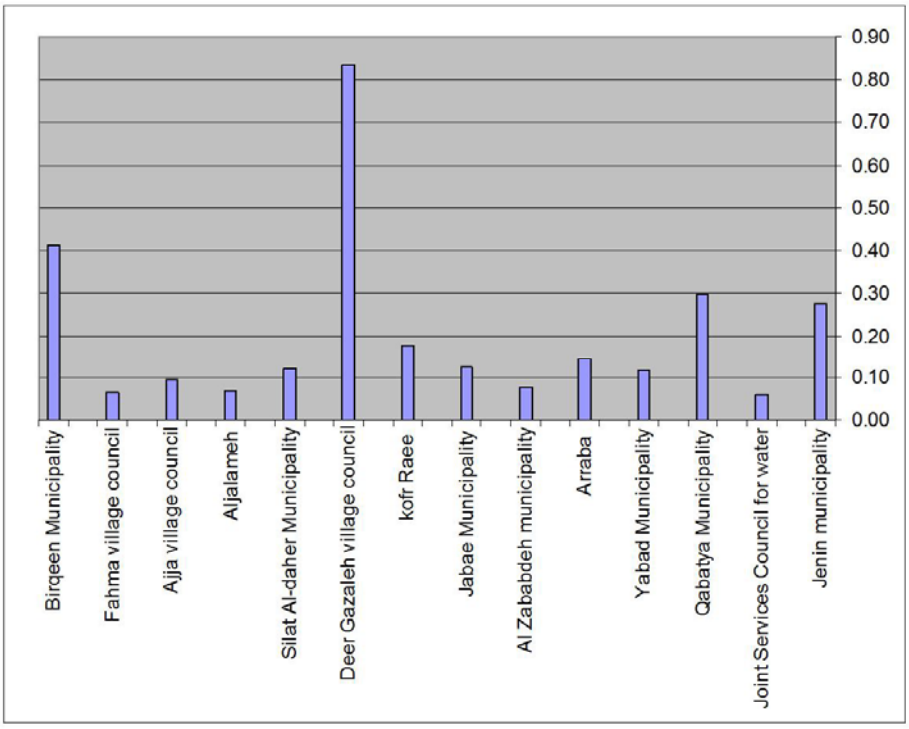

Fig. 5.7: Water consumption in municipalities, expressed as m3/conn/day.

5.5.1. Composition of UFW:

UFW can be broken down into two main components. The first of this is the physical component, representing pipe breaks and storage tank overflows; the second is the commercial component, which encompasses meter under-registration, illegal connections, etc.

5.6 Consumption

Consumption rates (liters per capita per day) are determined based on the total residential water sold (liters per day), divided by the population served. In this study, the average consumption rates were analyzed as a function of the size of the company (Fig. 5.8).

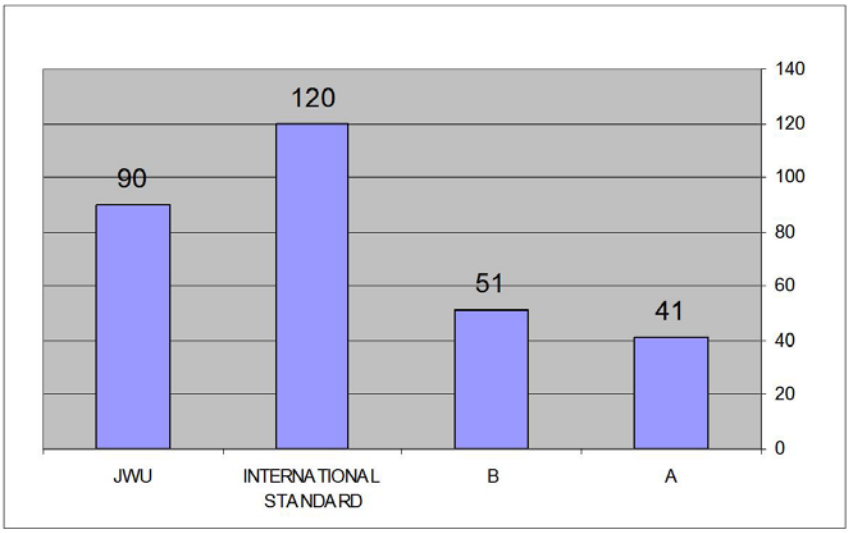

Fig. 5.8: Consumption (L/cap/day) in groups A, B, the JWU, and the international standard.

From the Fig. above, one can see that large cities and municipalities have the lowest consumption rates in the governorates. According to the Palestinian water authority, the Jenin governorate has the lowest consumption rate (after Tubas) in the West Bank. Fig. (5.9) below compares water consumption in the West Bank Governorates (PWA report, 2004).

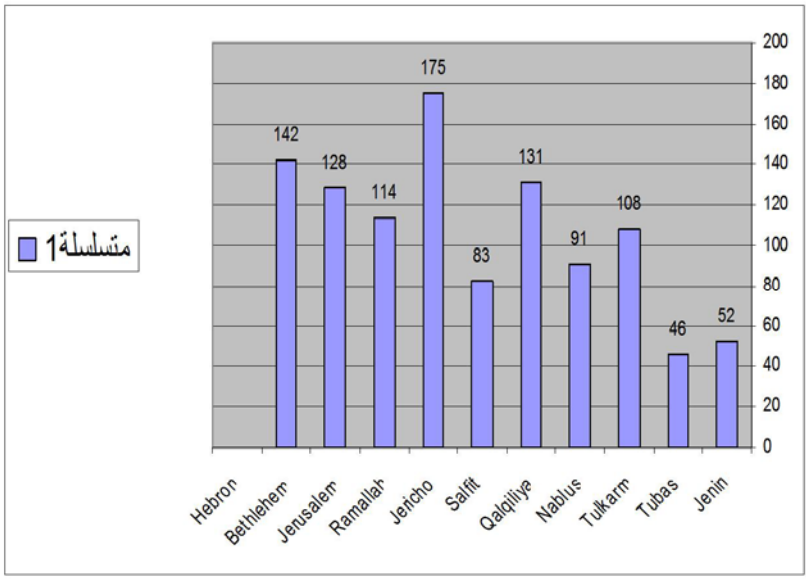

Fig. 5.9: West Bank governorates' water consumption rates (PWA).

5.7 Staffing

Water sector employees are grouped into 4 categories: management, administration, technical and operations. Small village councils have no full time employees and thus, higher plumbers to repair any pipe breaks whenever they occur. Even in all municipalities and village councils (excepting the Joint Services Council), new house connections are not installed by technicians of municipalities; rather, customers have to higher plumbers to connect their houses with the water network.

5.7.1. Number of Staff per 1000 Connections:

The number of staff per every 1000 connections is obtained by dividing the total number of employees (managerial, administrative, technical and operational) involved in the provision of water services, by the total number of connections, multiplied by 1000. As an indicator, this reflects the efficiency of the municipality. Table (5.3) below lists municipalities and village councils, and their respective number of employees per 1000 house connections.

Table 5.3: Municipalities and number of staff per 1000 connections

Institution name	Employees
Jenin Municipality	17
Joint Services Council	5
Qabatya Municipality	4
Ya'bad Municipality	6
Ar-Raba	2
Al-Zababdeh Municipality	4
Jabae Municipality	3
Kofr Raee	4
Deer Gazaleh Council	6
Silat Al-Dhaher	4
Al-Jalameh	5
Ajja village Council	4
Fahma village Council	7
Birqeen Municipality	4

This indicator is also illustrated in the Fig. (5.10) below.

Key observation: The Jenin municipality is over-staffed, since 17 employees per 1000 connections is far too high. The number of employees per 1000 connections in the other councils (except the JSC) is also not acceptable, since most municipalities

- have water from WBWD pumped into the networks;
- have no pumping stations to be operated;
- have new connections installed by contractors and not by employees from the councils; and,
- -collect are water and electricity bills jointly.

The municipal structures are, in particular, among the weakest in Palestine because of long periods of institutional neglect during the Israeli occupation. Even after the arrival of the Palestinian Authority, the pursuit of job creation or other social goals has left many municipalities over-staffed and inefficiently run. Some are grossly overstaffed, while others are staffed by insufficiently-trained operators. Many are in need of costly upgrades and water collection fees are insufficient to cover these costs.

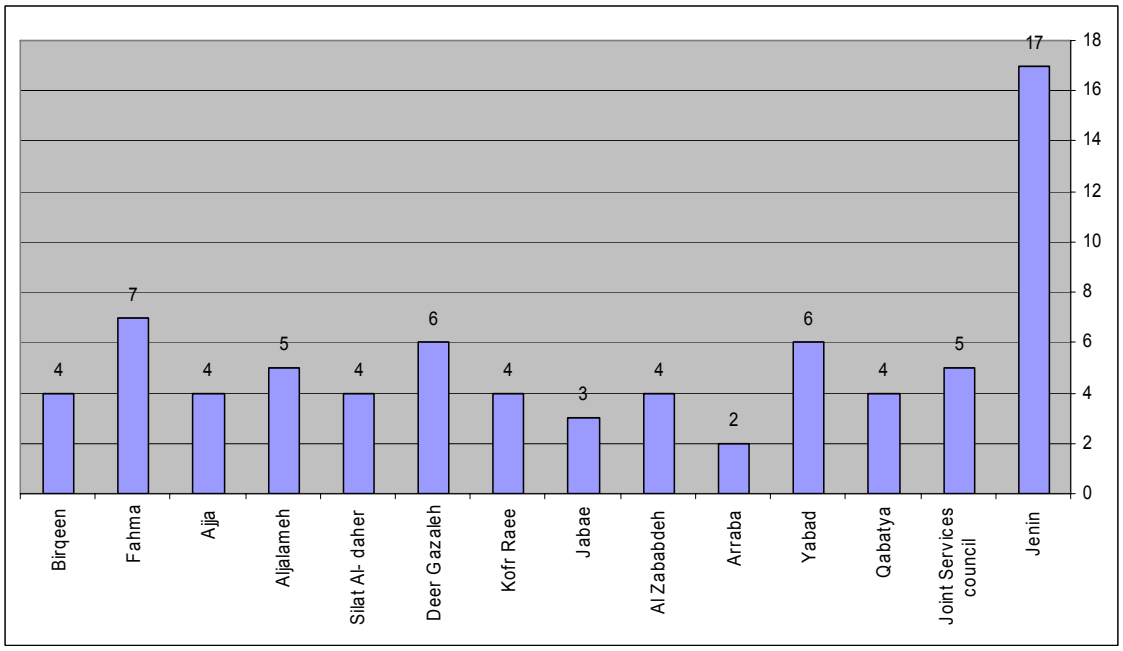

Fig. 5.10. Number of staff per 1000 water connections.

5.8 Continuity of Service

Continuity of service is measured as the number of hours each day that water is available to consumers. Interruptions to the drinking water supply occur either through intermittent sources or resulting from engineering inefficiencies, and are a major determinant of the access to quantity as well as quality of drinking-water.

Continuity can be classified as follows:

- Natural variation in source volume during the year.
- Volume limitation because of Israeli restrictions on pumping.
- Restricted pumping regimes in pumped systems, whether planned or due to failure.
- Peak demand exceeds the flow capacity of the transmission mains or the capacity of the reservoir.
- Excessive leakage within the distribution systems.

This classification reflects broad categories of continuity, which are likely to affect hygiene in different ways. Daily or weekly discontinuity results in low supply pressure and a consequent risk of in-pipe recontamination. Other consequences include reduced availability and lower volume use, which adversely affect hygiene. Household water storage in cisterns is necessary, and may lead to an increase in the risk of contamination

during storage periods and associated handling. Seasonal discontinuity often forces users to obtain water from untreated sources supplied by vehicle containers. In addition to the obvious reduction in quality and quantity, water deliveries by trucks are very costly.

Table (5.4) illustrates the continuity of water supply in Jenin governorate municipalities and village council.

Table 5.4. Continuity of water from municipalities and village councils.

Average hours of service /day (continuity)	.Institution
13	Jenin Municipality
4	Joint Services Council for water
18	Qabatiya Municipality
16	Yabad Municipality
6	Ar-Raba
12	Al-Zababdeh Municipality
16	Jabae Municipality
7	Kofr Raee
18	Deer Gazaleh
10	Silat Al-Daher Municipality
16	Al-Jalameh
8	Ajja Village Council
5	Fahma Village Council
22	Birqeen Municipality

Continuity of supply is also graphed for comparison in the Fig. (5.11) below.

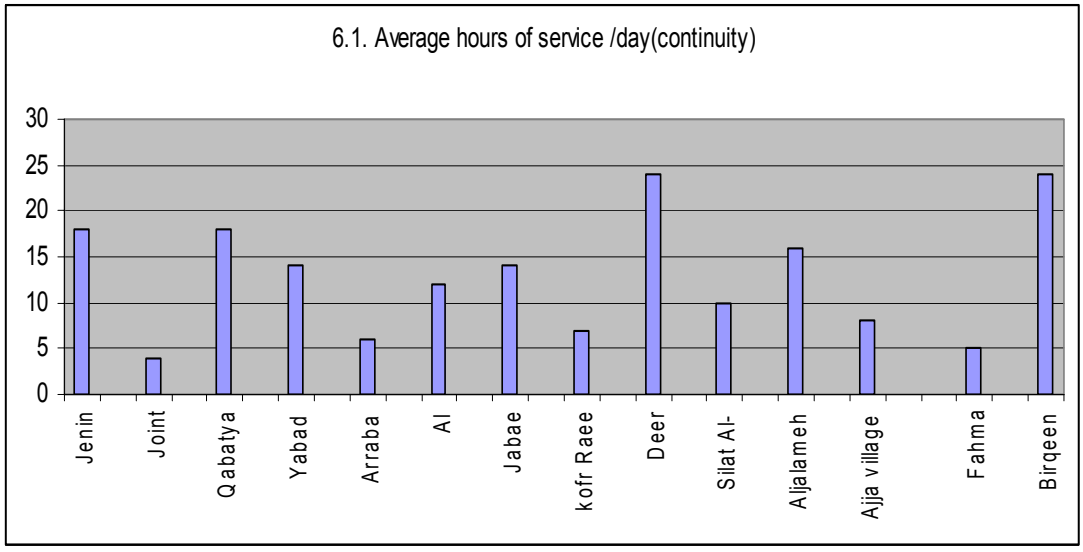

Fig. 5.11: Number of hours per day that water is supplied to customers by municipalities and village councils.

Key observations: .From the above graph (Fig. 5.11), we see that only Qabatiya, Birqeen, Deer Ghazala, Al-Jalameh, and Jenin, have 12 hours or more of water supplied per day to costumers. The reason for this is that these councils either have private wells or purchase water from agricultural wells. Other councils have only 3 to 8 hours of water supply per day. Water supplied from agriculture wells is not treated and even not tested before distribution to customers.

5.9 Pipe Breaks

The number of pipe breaks per year per 100 km of pipes in the water system compared to the annual number of water pipe breaks is used as an indicator of the structural state of a water network. Pipe breaks must be recorded from the point of installation of the first pipes, yet this is rarely put into practice by most municipalities. The majority of municipalities have no exact records of pipe breaks. The number the municipalities reported are estimated. These values are given in Table (5.6) below.

Table 5.5: The number of pipe breaks per 100 km per year in municipalities.

Institution	Length of water distribution network (km)	Number of water pipe breaks in the distribution network (#/year)	Number of pipe breaks/100 km of pipes
Jenin municipality	170	50	29
Joint Services co.	170	24	14
Qabatiya	80	42	53
Yabad	22	42	191
Ar-Raba	10.44	15	144
Al Zababdeh	12.95	13	100
Jabae Municipality	10	26	260
Kofr Raee	31	100	323
Deer Gazaleh	5	5	100
Silat Al-Dhaher	20	30	150
Al jalameh	7	10	143
Ajja Village Council	40	100	250
Fahma Village	20	50	250
Birqeen	25	45	180

Key observation: The infrastructures of municipal water systems in many villages and towns are in poor condition and deteriorating rapidly.

5.10 Connection fees

The connection fees are not the same in all municipalities. Fees range from between 300 NIS in Fahma, to 982 NIS in the Jenin municipality. The table below shows the fees levied in each municipality. It should be noted that connection fees are not calculated according to any specified analysis, which accounts for the large differences among the municipalities.

Table 5.6. Connection fees for house connection in individual municipalities.

Institution name	Connection Charge (NIS)
Jenin municipality	982
Joint Services Council for water	950
Qabatya Municipality	500
Yabad Municipality	480
Arraba	280
Al Zababdeh municipality	750
Jabae Municipality	600
kofr Raee	600
Deer Gazaleh village council	300
Silat Al-daher Municipality	450
A ljalameh	900
Ajja village council	500
Fahma village council	300
Birqeen	620

A graphic depiction of these values is presented in the Fig. (5.12) below.

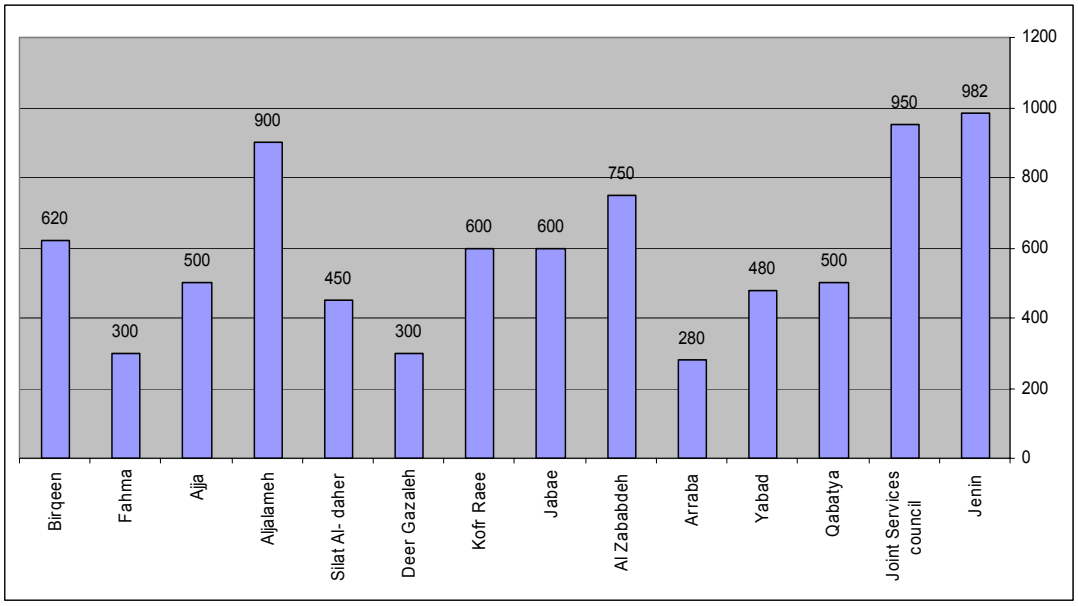

Fig. 5.12: Municipalities and their respective connection fees.

5.11 Collection ratio

The collection ratios in the municipalities included in this study are not the same in all municipalities and village councils. Ratios were found to range from 7% in Fahma to 82% in Al-Zababdeh. Fig. (5.13) below compares these collection ratios for the municipalities and village councils

.

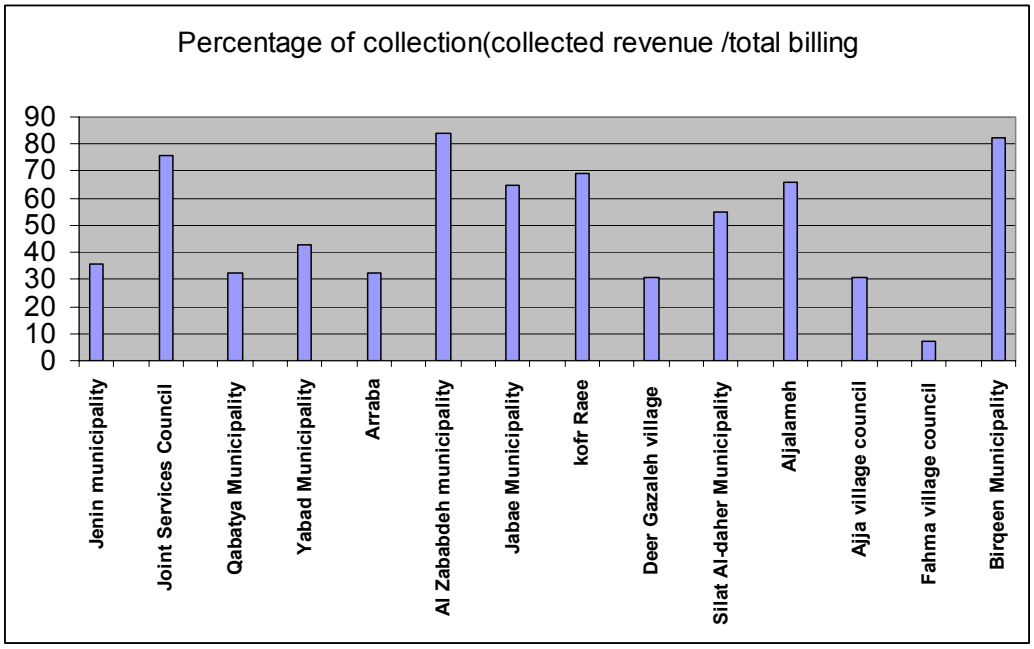

Fig. 5.13: Collection ratios shown by municipality and village.

Key observation: It was found that the collected revenue is not related to consumption rate nor any other indicators mentioned; instead, it is dependent on the culture of each city or town and reflects the effort exerted by municipalities to raise the collection ratio.

5.12 Labor costs

Labor cost is understood to be the total cost of cost in NIS, divided by the total water quantity sold in cubic meters. The amount spent on labor by the municipalities is presented in the Fig. (5.14) below.

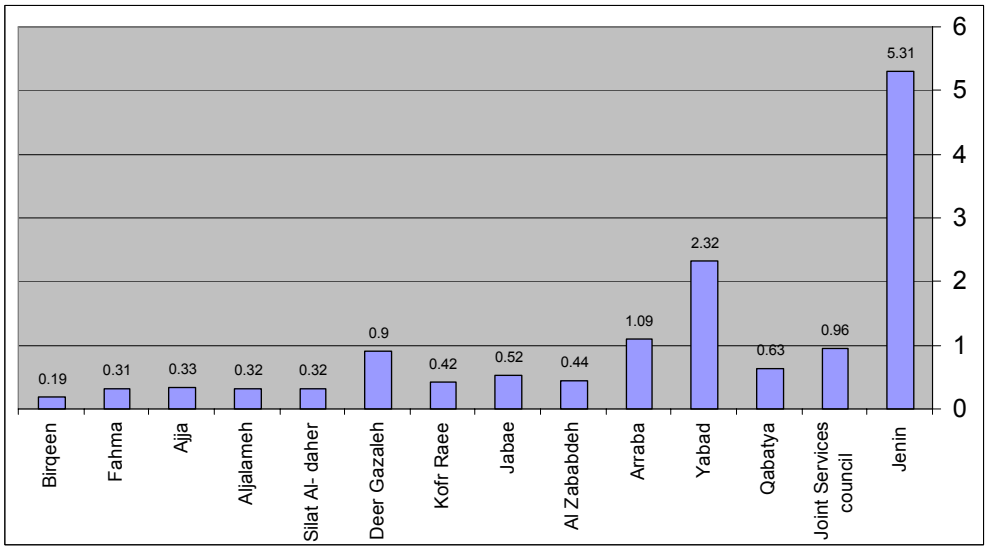

Fig. 5.14: Labor cost per cubic meter of water sold.

Key observation: The labor cost in all municipalities is considered acceptable (except for the Jenin municipality) compared to JWU or compared to developing countries. The Jenin municipality is over-staffed for both political and social reasons and thus spends an excessive amount on labor.

5.13 Residential tariff per M3

Average residential tariffs per cubic meter of water are calculated by dividing the total revenue received from consumer billing by the total residential consumption. Fig. (5.15) below shows these averages for each municipality.

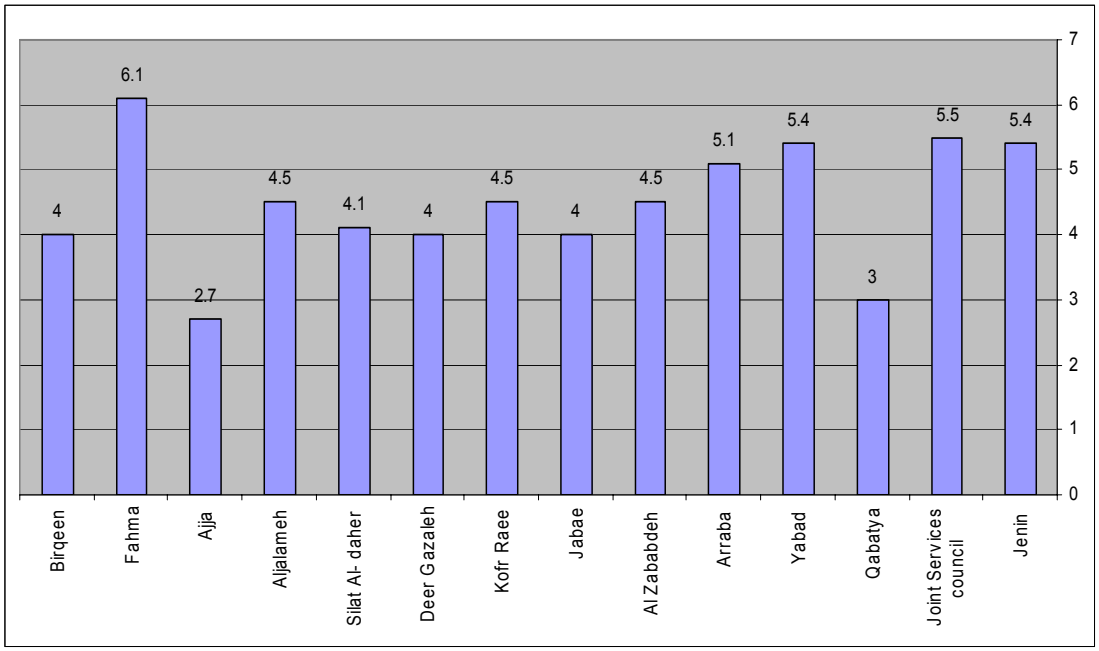

Fig. 5.15: Average residential tariffs received by municipalities.

Chapter Six

Conclusion & Recommendations

Small village councils and committees face unique challenges. They have limited financial and technical resources, often lack sufficient full-time staff to manage the utility properly, and may be geographically isolated in rural areas.

6.1. Asset accounts and depreciation

All municipalities and village councils neglected to report on their capital assets, except the Joint Service Council for Jenin's western villages. Asset and depreciation accounts, which handle tangible items of value in municipalities and village councils, are not included in the balance sheets of these municipalities and village councils. Instead, they use single-entry records, which present many disadvantages. These disadvantages include:

- Single-entry records do not provide a check against personal error;
- This accounting method may lead to inefficient administration;
- Theft and other losses are less likely to be detected; and,
- Because no accounts are provided for many of the items appearing in both the Income Statement and the Balance Sheet, omission of important data is possible.

It is suggested here that using double-entry records would solve some, if not all, of these accounting issues.

In many areas, water quality is not tested. Aside from the Jenin municipality, there are no municipalities qualified to conduct water tests and therefore, there is a need to establish water labs in the municipalities, especially in the larger ones.

- There is a great shortage in water supplied to all municipalities and village councils. When supplies of water are low in the summer months, the Israeli water company, Mekorot, closes the valves which supply Palestinian towns and villages so as not to affect Israeli supplies.
- Palestinians are not allowed to drill new wells (or to extend existing ones).
- Additional water should be supplied to these municipalities and village councils.
- Attempts must be made to resolve allocation disputes with Israel, with such resolutions being governed by principles of international water law.
- Improving the performance of water service is a process which needs commitment, support and participation of all stakeholders, especially national and local governments.

- Municipalities and village councils in the Jenin governorate employ different tariff structures, based on the limited data available and with limited application of basic tariff design principles. The PWA Tariff Policy should be adopted.
- Most utilities show weak financial performance, resulting from neglect and under-investment during the period of Israeli Occupation and from inexperience of present day management
- Users have maintained old habits of late or non-payment of water bills, which was common during the Israeli Occupation.
- The current situation in many municipalities is characterized by interference from elected or appointed members of village councils and municipalities.
- Members of village councils have been known to become overly involved in the daily operations of municipalities' service delivery, especially water service.
- Most municipalities and village councils are not paying their professional staff market rates of remuneration, which affects the quality of personnel willing to do fill these positions.
- Staff do not have job descriptions, and promotion is based on age, not merit. Most of all, there are no incentives for staff to perform well. Many staff in these municipalities have no skills, and some are also "ghost staff," employees who are listed on the books and receive wages without being physically present (evident in the Jenin municipality).
- Interestingly, there are many highly educated technical and engineering professionals in these institutions, but while utilities lack autonomy, accountability, transparency, and proper management, these skills to a large extent go untapped.
- Capacity building is an explicit goal for each of the municipalities and village councils, but strategies for implementing steps towards this objective have not been developed by any of them.
- There is a need to improve the performance of local authorities through training in management skills, and by organizing training workshops and capacity building programmes for mayors, local council leaders, and technical staff and even the staff of the Ministry of Local Government.
- Training programs should cover all of the areas necessary for running a water system, including metering, customer service, financing, administration, and human resources management, as well as water treatment, water distribution, and public health.
- Regulation of all aspects of water sector should be the sole purview of the PWA.
- Establishment of a regional utility (e.g., the planned Northern Utility by PWA for Nablus, Jenin, Tulkarem, Qalqilia, Salfit and Tubas Governorates).
- The development of appropriate municipal organizational structures, with qualified staff, is essential if municipalities are to provide cost effective services to citizens, including but not limited to water service

6.2 Sustainability

Building sustainable capacity at the level of municipal local government can be accomplished by:

- mobilizing revenues on a sustainable basis;
- improving cost recovery; and,
- - strengthening municipal financial and asset management.

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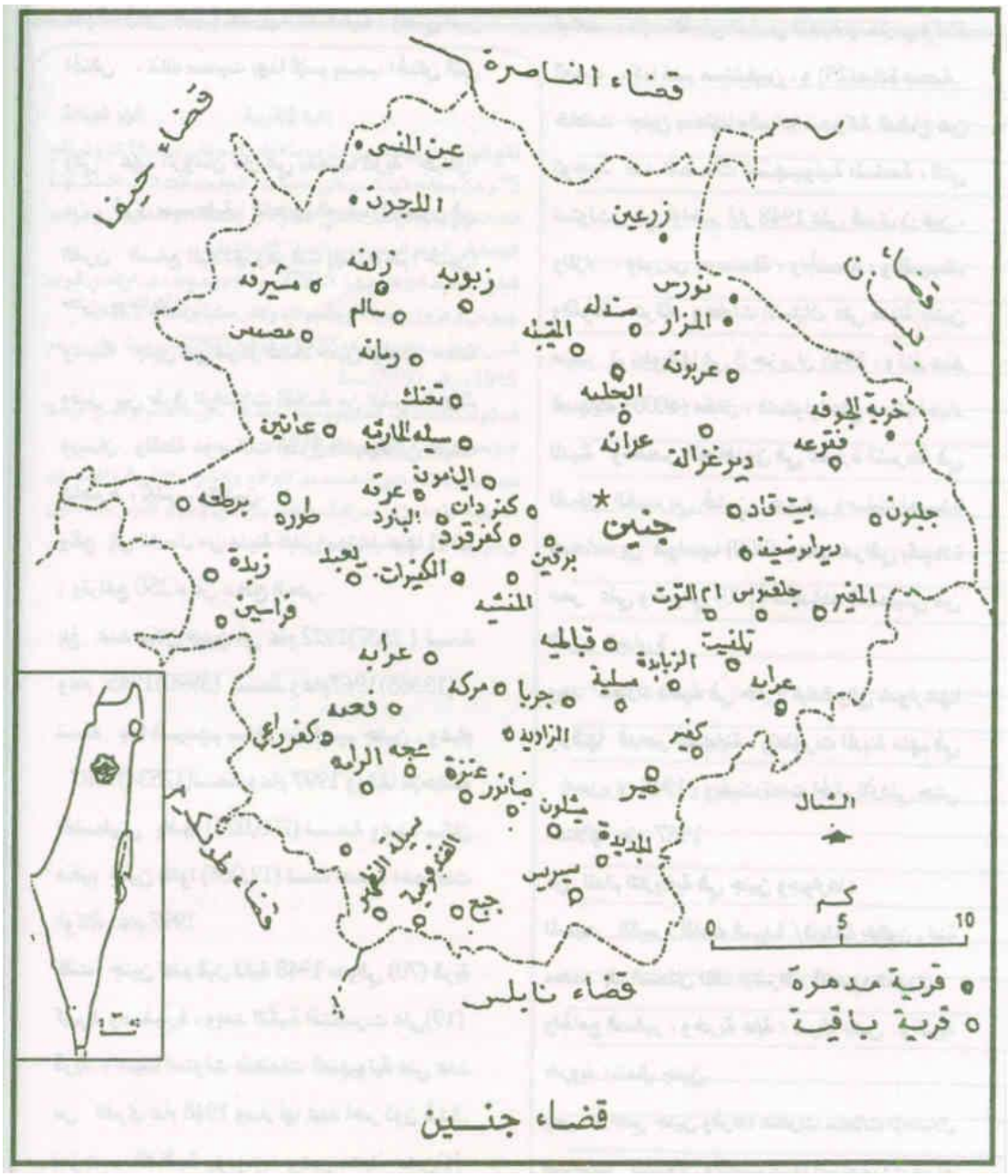
Appendix 3.1: map of Jenin



Appendix 4.1: Questionnaire:

Dear _____:

Hello, my name is Moneer Hosseen Mohammad Mostafa and I am a student at Al-Quds University. I am currently working on a research for my master thesis titled:

Managing Water Service in local government localities in Jenin Governorate
Current Status and Recommended Solutions

In order to do that I have designed this survey.The questionnaire is in English and will take some 8 to 9 minutes to complete.

I would greatly appreciate you taking a few minutes of your time to complete the following survey , as its results will serve understanding the current performance of all water utilities in Jenin governorate

Participating in this study, your utility will be provided with the compiled results of this study.

If you have any questions, please feel free to call or email me.

Thank you very much for both your time and your effort.

Moneer Hosseen Mohammad Mostafa
Sustainable Rural Development Programme
Al-Quds University
E-mail :jsc-west@yahoo.com
TEL 042431606

Note:

1 .Information provide should be for the year 2005

2.For all financial information, please specify in N IS

3. When the answer to a question is not known, please leave blank. Blank cells will be treated as 'not available' data.

Section 1. Contact Details

1.1.Institution name……..
1.2.Utility type(Municipality, village council, other)
……..
1.3.Mayor/Chief of Council name……
1.4. Name of focal person……
1.5.Title……..
1.6. Telephone……..
1.7.Fax…….
1.8. Email:……

Section 2. General Information.

2.1.1Type of council(rural/urban)……..

2.2 Type of services provided (please tick relevant boxes)

☐ water supply service only
☐ water supply service plus other services please specify
…….

2.3 .Type of water utility (please tick relevant boxes)

☐ Utility with separate financial reporting for water supply
☐ Utility with no separate financial reporting for water supply

Section 3.Water Coverage

3.1 Size of Utility's area of Responsibility : ----------sq.km
3.2 Population of Utility's area of responsibility : ----------
3.3 Population served by the Utility : ……
3.4 Population served by the Utility with piped water supply(service connection) : ----------

Section 4. Infrastructure Description & Water Consumption and Production

4.1 Source of raw water (please tick relevant boxes)

☐water from another utility / company
☐Groundwater
☐ Mekorot

Other , please specify……
4.2 What are the main methods of treatment used (please tick relevant boxes)

☐ Disinfection
☐Filtration
☐Other , please specify ----------

4.3. Capacity of production systems : ----------m^3/day
4.4. Length of water distribution network : ----------km.
4.5. Capacity of storage in system ----------m^3

4.6. Piped water supply connections : please specify how many in each category

Domestic (Households)	**Non Domestic** (Industrial , commercial , Institutional , other)	**TOTAL**

4.7 .Total water produced during the year 2005 …… m^3.
4.8. Total water purchased during the year 2005…….. m^3.
4.9 .Total water sold during the year 2005……... m^3

Section 5.water consumption & Production
5.1 .No. of Microbiological tests of water performed during the year and complying with applicable standards or legislation……..
5.2 .No. of Physical- chemical tests of water performed during the year and complying with applicable standards or legislation……
5.3 .No. of water tests performed during the year……..

Section 6. water supply system Performance
6.1. Average hours of service /day
6.2.Number of water pipe breaks in the distribution network :--------#/year

Section 7. Staff
7.1. who does the work in your company : (please tick relevant boxes)
 permanent staff
permanent staff – with contract
casual / part – time – contract staff
casual / part – time – wages
contracted out to outside company / agency
other , please specify

7.2 Number of staff in the company: please specify how many in each category

Corporate Services (Management, Admin, Finance, Technical, etc.)	**Water Supply** (O&M, Customer Services, Support Services, etc)	**Other non water supply** (e.g. wastewater, drainage, environment services**)**	**TOTAL**

7.3 Number of staff that participated in at least one training event during the year: _____ staff
7.4 Total number of training days _____ days
7.5 Proportion of total operating budget used for Human Resource Development (HRD): _____%
7.6 No of house connection

Section 8. Customers

8.1 Number of new customers connected to water supply system during the year: _____ # / year
8.2 Number of customer complaints recorded during the year: _____ # / year
8.3 Means by which customer can make a recorded complaint (please tick relevant boxes)
 in person
by telephone
 by email
 by letter
 other method, please specify
_____
8.4 How does the Utility find out the views of its customers (please tick relevant boxes)
 from customer interactions (letters, telephone calls, enquiry counter, etc.)
by responding to customer complaints
from customer surveys, questionnaires, etc.
by market research
 other method

Typically what is the connection charge for new customers: please specify how much in each category

Domestic (Households)	**Non Domestic** (Industrial, commercial, Institutional, other)	**Bulk water sales**	**AVERAGE of all categories**

Typically what is the water tariff for metered consumption: please specify how much in each Category

Tariff block	**Domestic**			**Non Domestic**			**Bulk water sales Tariff**		
	From	To	Cost/m3	From	To	Cost/m3	From	To	Cost/m3
1.	0			0			0		
2.									
3									

Section 9. Finance
9.1 Other water supply revenue (e.g. materials sales, construction, etc.):
_____
9.2 Total water supply revenue (i.e. Water consumption revenue + Other):
_____
9.3 Year end Accounts Receivable (water billings & all other outstanding invoices):
_____

9.5 Water supply operating expenses of the company: please specify how much in each category

Labour Costs	**Electricity**	**Chemicals & other Materials**	**Contracted out services**

Section 10. Capital Investment

10.1 Principal source of funds for investment in the last 5 years: (please tick relevant boxes)

- own internal sources of funding
- grants
- loan from Commercial Bank
- private sector investment
- other method, please specify……

10.2- Operating cost……..IS
10.3 -Total cost……..IS
10.4-Total billing…… IS
10.5- Collected water Revenue…… IS
10.6-Staff cost…… IS
10.7 –Depreciation…… IS
10.8-Total Operating revenue…… IS
10.9 -Vehicles available…… IS
10.10-Total assets……...IS

"Thanks"

Appendix 4.2: Questionnaire in Arabic

بسم الله الرحمن الرحيم

السادة بلدية/مجلس.....

يقوم الباحث بإعداد رسالة ماجستير بعنوان:

"ادارة خدمة المياه في الهيئات المحلية في محافظة جنين"
" واقع وحلول "

وذلك استكمالا لمتطلبات درجة الماجستير في التنمية المستدامة – بناء المؤسسات / جامعة القدس. يرجى من حضرتكم الإجابة على فقرات هذه الاستبانة من أجل تحقيق أهداف هذه الدراسة، علما أن البيانات التي تجمع ستستخدم لاغراض البحث فقط وسيتم لاحقا تزويدكم بنسخة عنها.

"شاكرين لكم حسن تعاونكم"

الباحث
منير جرادات
برنامج التنمية الريفية
جامعة القدس / أبو ديس

ملاحظة:

1- المعلومات المعبئة عن السنة 2005

2- العملة بالشيكل

3- في حالة عدم معرفة الاجابة اترك المربع فارغ

القسم الاول: معلومات عن الهيئة المحلية

1- **اسم الهيئة**.....

2- **نوع الهيئة(مجلس قروي، بلدية،اخرى)**.....

3- **اسم رئيس الهيئة**.....

4- **اسم معبىء الاستمارة**.....

5- **وظيفة معبىء الاستمارة**.....

6- **رقم التلفون**.....

7- **رقم الفاكس**.....

8- **البريد الالكتروني**

القسم الثاني معلومات عامة

1- نوع الخدمة المقدمة

☐ **خدمة تزويد المياه فقط**

☐ **-خدمت تزويد المياه مع خدمات اخرى يرجى تحديدها**.....

.....

.....

.....

2- نوع الهيئة المحلية من حيث

☐ **-هيئة ذات حسابات مالية منفصلة لخدمة المياه**

☐ **- هيئة بدون حسابات مالية منفصلة لخدمة المياه**

القسم الثالث معلومات عن حجم تغطية الخدمة

1- مساحة منطقة عمل الهيئة.....**كلم^2**

2- عدد السكان الكلي في منطقة عمل الهيئة.....

3- عدد السكان المخدومين.....

4- عدد السكان المخدومين بواسطة وصلات منزلية.....

القسم الرابع- وصف لحالة مشروع المياه والانتاج والاستهلاك.

1-مصدر المياه

- مياه مشتراة من جهات اخرى

- مياه جوفية

-مياه من شركة المياه الاسرائيلية(مكروت)

- اخرى

2- نوع معالجة المياه

- تعقيم بالكلور

- فلترة

- اخرى

3- قدرة انتاج المياه.....م^3 / يوم

4- طول شبكات التوزيع.....كلم

5- حجم المياه التي يمكن تخزينها.....م^3

6-عدد وصلات المياه

وصلات منزلية	غير منزلية	المجموع

7-كمية المياه المنتجة خلال العام 2005 ..... م3

8-كمية المياه المشتراة خلال العام 2005 .....م3

9- -كمية المياه المباعة خلال العام 2005 ..... م3

القسم الخامس نوعية المياه

1- عدد الفحوصات البيولوجية الناجحة التي تم عملها خلال العام.....

2- عدد الفحوصات الكيميائية والفيزيائية الناجحة التي تم عملها خلال العام.....

3- عدد الفحوصات الكلية التي تم القيام بها.....

القسم السادس نوعية الخدمة

1- **عدد ساعات الخدمة باليوم**.....

2- **عدد كسورات الانابيب في شبكات المياه خلال السنة.....**

القسم السابع الموظفين

1- نوعية الوظائف في المؤسسة

□ **- وظائف دائمة**

□ **- وظائف دائمة بعقد**

□ **- وظائف لاوقات محددة بعقد**

□ **- وظائف لاوقات محددة مياومة**

2- عدد الموضفين وانواعهم

- عدد الموظفين الاداريين.....

- عدد موظفي التشغيل والصيانة.....

- المجموع.....

3- عدد الموظفين الذين شاركوا بدورات تدريبية خلال العام.....

4 - مجموع ايام التدريب.....

5 - نسبة الانفاق على تنمية الموارد البشرية من الموازنة.....

القسم الثامن المشتركين

1- **عدد الاشتراكات الجديدة خلال العام**.....

2- **عدد الشكاوى من المشتركين خلال السنة.....**

3- **الطريقة التي يستطيع بها المشترك من تقديم الشكاوي**

□ **بواسطة حضوره شخصيا**

□ **بواسطة الاتصال تلفونيا**

□ **بواسطة البريد الالكتروني**

□ **بواسطة المراسلة**

□ **طرق اخرى، حدد.....**

4- **كيف تستطلع المؤسسة استطلاع اراء المشتركين**

□**من المشترك مباشرة(تلفونيا،بالمراسلة،شخصيا)**

□**بواسطة استبيان**

□**بواسطة بحث ميداني**

□اخرى ،حدد

5- **قيمة رسوم الاشتراك المنزلي.....**

6- **قيمة رسوم الاشتراك التجاري والصناعي.....**

7-تسعيرة المياه

فئة التسعيرة	منزلي			غير منزلي			BULK		
	من	الى	شيكل/م3	من	الى	شيكل/م3	من	الى	شيكل/م3
1	0			0			0		
2									
3									
4									

القسم التاسع التمويل

1- عائدات المياه.....شيكل

2- عائدات اخرى(تمديدات جديدة،بدل عمل).....شيكل

3- مجموع العائدات.....شيكل

4- نهاية السنة المالية.....

5- اثمان مياه مشتراة.....

6- نفقات تشغيل المؤسسة

تكلفة العمل	طاقة	مواد كيميائية	مصاريف ادارية	اية اعمال اخرى

القسم العاشر- الاستثمارات الراسمالية-معلومات اخرى

1- المصدر الرئيسي للتمويل خلال سنوات الانتفاضة

- **تمويل ذاتي**
- **هبات**
- **قروض**
- **استثمار خاص**
- **طرق اخرى**

2- نفقات التشغيل.....

3- النفقات الكلية.....

4- مبيعات المياه.....

5- قيمة الجباية.....

6- رواتب واجور.....

7- الاستهلاك.....

8- العائدات الكلية.....

9- عدد السيارات لدى المؤسسة.....

10- مجموع الاصول.....

وشكرا