

City Structure of Zarqa - Jordan: Problems and Solutions

مشاكل و حلول البنية الهيكلية لمدينة الزرقاء في الأردن

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تواجه مدينة الزرقاء، أول مدينة صناعية في الأردن وثاني أكبر مدينة من ناحية عدد السكان بعد العاصمة عمان، مشاكل عديدة من ناحية تخطيطية و تنظيمية بسبب عدم وجود مخطط ميكلي قبل عام ١٩٧٦.

إن معظم مشاكل مدينة الزرقاء من شأنها لحل مشاكل العاصمة عمان على حساب مدينة الزرقاء. فمحطة التنقية للمياه (حريرة السمراء) ومحطات توليد الطاقة والكهرباء ومصفاة البترول الأردنية ومكب نفايات العاصمة كلها موجودة في الزرقاء وهي التي تسبب معظم المشاكل البيئية والحضرية والتخطيطية للمدينة.

إن وسط مدينة الزرقاء يعاني من مشاكل عديدة نتيجة وقوع المخيم العسكري بالقرب منه والذي يحد أي توسع مستقبلي للمدينة من ناحية الشرق.

يهدف هذا البحث إلى دراسة تخطيط مدينة الزرقاء الهيكلية وإلغاء الضوء على أهم مشكلة ومحاولة وضع أطر عامة لحل هذه المشاكل في المستقبل من ناحية تخطيطية.

Abstract

Zarqa, the first industrial city in Jordan and the second largest city after the capital Amman in terms of the number of population, suffers from its homophorus layout due to uncontrolled growth before 1976.

Most of the Zarqa problems nowadays is the result of solving Amman problems in its boundaries. The purification plant of Zarqa, the electricity generators, the Refinery and even the solid waste disposal site, that serve Amman are located in Zarqa. These cause a lot of pollution problems.

The city center of Zarqa also suffers from bad planning. The military campus eastern Zarqa limits any future expansion to the east.

This study aims to shed light upon Zarqa development and city structure from earlier stages until recent days. It also investigates its regional and city problems and suggests several solutions to reach a comfortable environment.

I. Introduction

1.1 Historical Background

Jordan lies in the western part of the fertile Crescent, where a communal urban layout existed around 3000 B.C. (Badawy, 1966). During the fifth century B.C. the Nabataeans, coming from Arabia, established a great civilization to the southern part of Jordan where Petra city was their capital (Bowersock, 1977).

During Roman period several cities were erected in the fertile Crescent such as Jerash to the northern part of Jordan. Several ancient sites in Amman, the capital of Jordan, and Zarqa are found in recent history. (Egan, 1980).

During Islamic period around 636 the Zarqa castle was built. Zarqa importance increased during the Ottoman period, when Al-Hijaz rail route constructed during 1900 and 1908 between Ma'an South of Jordan and Damascus, capital of Syria, passing through Zarqa site for the purpose of pilgrimage. The Chechan started to arrive from central Asia and settled in 1902 around Zarqa River. In 1926 Zarqa became the base for the military force that control the eastern section of Jordan when a large number of houses were erected to house the soldier's families (Zarqa Municipality, 1994).

1.2 Location

Zarqa city lies to the north-east of the Capital Amman, (fig 1). It is considered the second largest city in Jordan in terms of the number of population with about 608626 inhabitants. (Statistical Department of Jordan, 1994).

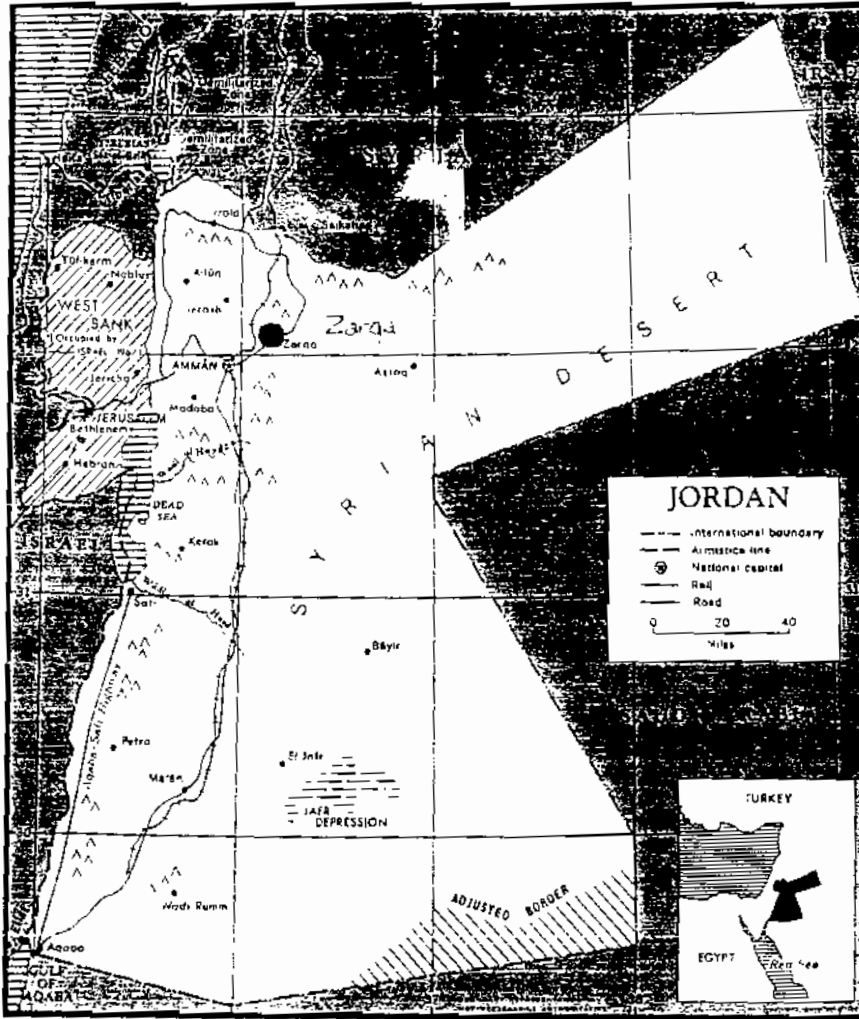


Fig (1) Location of Zarqa
Source: The Middle East, 1980

Zarqa is surrounded by three different barriers that limits any future expansion: the Jordan refinery to the north, Rusaiifa town, where phosphates mines existed, to the south and a huge military campus to the east. The western section of the city has same natural constrains due to the natural topographical layout that rises 795m above sea level

A trace for the Zarqa River is in the central part of Zarqa which divides the city into two sections, east and west. Zarqa River comes originally from Amman and passes through Zarqa then continues its journey to Jordan River in the West. (Zarqa Municipality, 1994).

1.3 Climate

Zarqa is located to the south-east of the Mediterranean Sea climate and to the north of the Jordan Desert climate. Two seasons are usually prevailed; Winter and Summer. During Winter temperatures varies from 8-10 degrees centigrade, and during Summer from 20-35 degrees centigrade. The rain is relatively low, about 300-400mm annually (Zarqa Municipality, 1992).

2. City Structure

2.1 Development of Structure

Zarqa area during 1918 was about 150,000 square meter. No development plan was introduced to Zarqa until 1976, when at that time its area reached 19,500,000 square meter. All the development before 1976 was irregular in terms of its organization and layout. Zarqa expanded alongside the Zarqa River to the north and south. It reached the Jordan Refinery to the north and Al-Rusaiifa to the south

More areas for development were added to Zarqa during years 1983, 1986, 1987 and then each year until 1994. (Fig 2). The total area of Zarqa reached 5.1 square Kilometer, of which much of its expansion was to the west. (Fig. 3).

The planning of Zarqa can be divided into two types:

The irregular or amorphous planning before 1976, and the regular planning after 1976 when the first development plan was introduced by Zarqa Municipality. Zarqa Municipality was founded in 1928. It's main role was to introduce the Landuse plan where no other regulations concerning building heights, ratio of built forms, floor ratio or setbacks were tackled. (Zarqa Municipality, 1994.)

2.2 Landuse

The land subject to regulations within Zarqa Municipality is 53%, or about 26,288,000 square meter. The remaining, 47% ratio is vacant land, most of it has been added during 1993 and 1994 development.

The Landuse plan in Zarqa can be divided into five different zones:

- a. The residential zone is about 79% of the regulated land, or 20,569,000 square meter, of which 29% follows the building regulations, and about 50% is still vacant land.
- b. The industrial zone mainly in the north of Zarqa and some areas to the south, without including Al-Rusaifa industrial area, is about 4.7% of the regulated land, or 12,390,000 square meter
- c. The commercial zone, in the center, is about 2.6% of the regulated land, or 681,000 square meter.
- d. The open space ratio is about 9.7% of the regulated land, or 2,538,000 square meter.

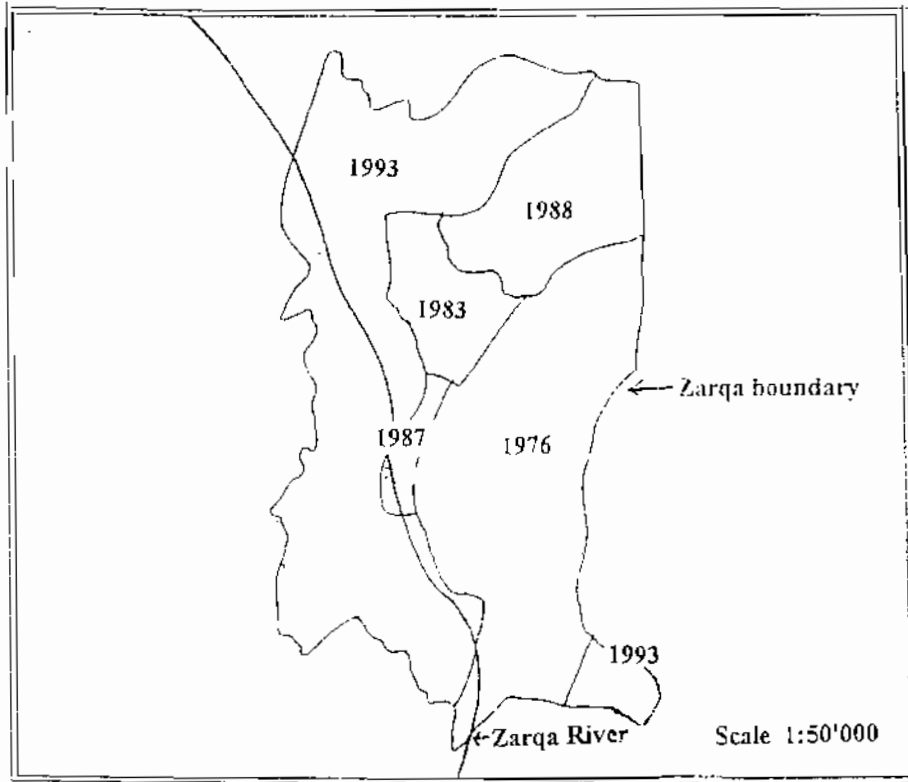


Fig (2) Development of Zarqa
Source. Zarqa Municipality, 1994

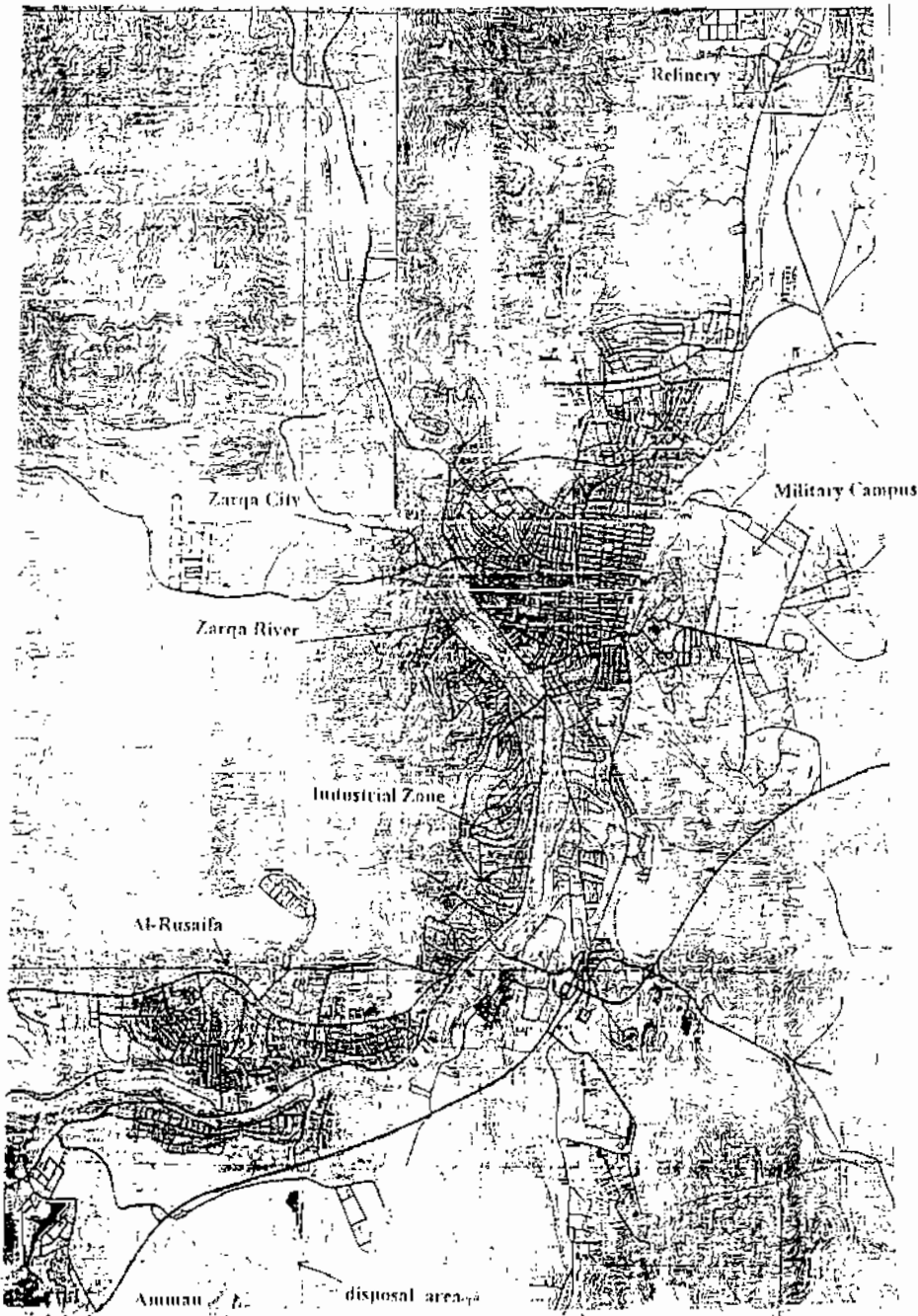


Fig (3) Structure of Zarqa
Source: Zarqa Municipality, 1994

Scale 1:50'000

- e. A small area for agricultural use is within Zarqa Municipality which constitutes about 4% of the regulated land, or 1,051,000 square meter. (Zarqa Municipality, 1994).

2.3 Development of Built Form

2.3.1 Early stage

Zarqa built form before 1959 was almost nothing. The estimated built residential area in 1990 was 9,361,000 square meter, of which only 0.7% was built before 1959. After that, a gradual increase of 3% until 1964; and to 7.7% until 1969. After 1969 and until 1979 much were achieved where the ratio reached 39.9%.

2.3.2 Middle stage

Between the years 1979 and 1984 a large increase in the built forms in residential sector occurred due to several factors that affected Middle Eastern cities mentioned by Castello in 1977, those, the lay down of the development plan of 1976, the accelerated growth of natural population and the rural-urban migration due to the location of large number of industries in and around Zarqa. The ratio of built forms in residential sector between 1979 and 1984 alone was 30.4%.

2.3.3 Late stage

Between the years 1984 and 1987 the ratio of development and built form decreased. In 1987, 82% of the total residential built area was achieved. This was happened due to several economical factors affected Jordan and Middle East (Fig. 4)

A modest and constant increase between the years 1987 and 1990 occurred. (Zarqa Municipality, 1992).

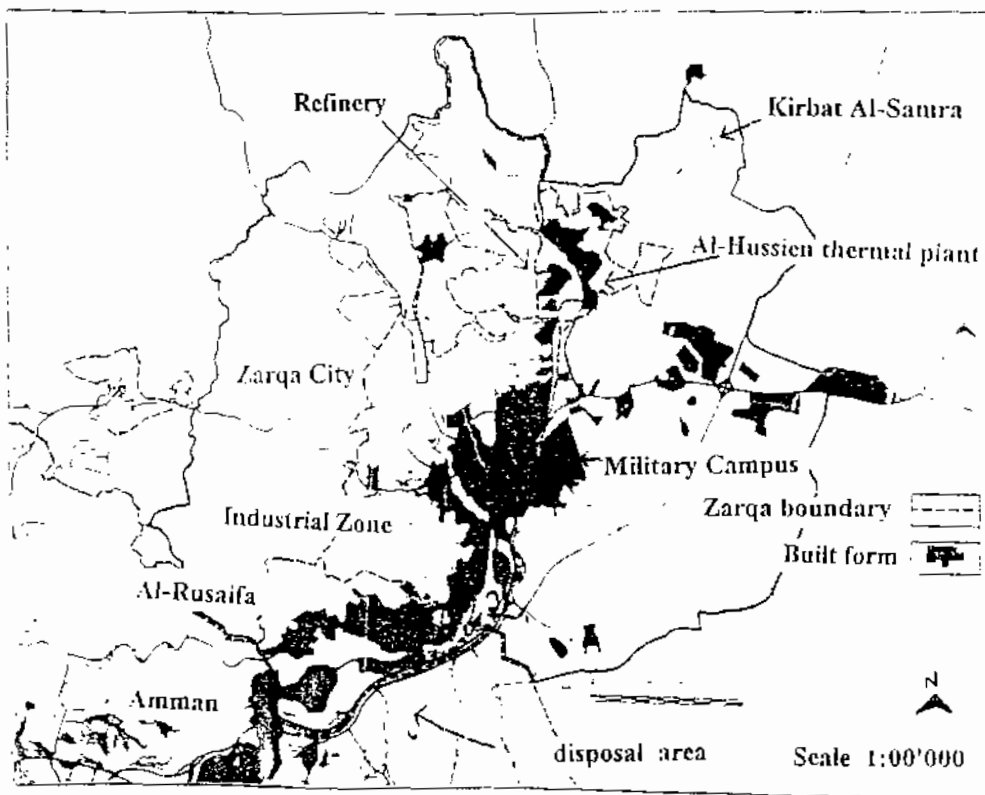


Fig (4) Built Form of Zarqa
Source: Zarqa Municipality, 1994

3. City Economy

3.1 Industry:

Zarqa is considered the first industrial city in Jordan. All different types of industries: heavy, medium and light exist. The heavy industry is located 6 Kilometers north of Zarqa city center where the Jordan Refinery built in 1960 which employs more than 3500 labours. and the Al-Hussem thermo plant for electricity production built in 1975 and located east of the Refinery, which produces 50% of total electricity produced in Jordan. and employs 500 labours. This thermo plant supplies also Amman with electricity. (Electricity Company, 1995).

Phosphate production company is located to the southern part of Zarqa in Al-Rusaifa town. This town houses more than 20000 Inhabitants most of them used to work in phosphate mines at earlier stages before the 1980s. These mines were closed during 1980s but Al-Rusaifa town continued to grow due to the erection of more than 45 factories in Al-Rusaifa and southern sectors of Zarqa. (Al-Bashir, 1995).

Some light industries and craftsmen shops are located inside Zarqa especially in the city center.

3.2 Commerce

Commercial zone in Zarqa is located mainly in city center. It is spread alongside main roads. No future expansion zone is suggested in the skeleton map of 1976

Due to the large number of factories located in and around Zarqa more than 3869 companies were established and more than 10441 businessmen are registered in commerce and trade dependent. (Department of Commerce, 1995).

3.3 Tourism

Zarqa city contains several historical sites such as Zarqa castle built during Ummayyad Islamic period on ancient Roman site and converted to palace in later stages, named Shabir Palace. (Ministry of Tourism, 1995)

Several historical sites exist around Zarqa such as, Azrak Palace, Amra Palace, Al-Shaer Palace, Al-Jarh Hammam (both) Al-Halabat Palace, all of Ummayyad Islamic origin. This in addition to two protected sites for animals named Al-Sumar and Al-Azrak. (Hoag, 1977).

Al-Hijaz rail road and station was among the best rail/road stations at Sultan Abd El-Hamed, the emperor of Ottomans during the beginning of this century. Its importance was gradually decreased after, and very few trains use this railroad nowadays. (Abu-Ghazaleh, 1990). Despite all these historical sites in and around Zarqa no real interest in tourism is seen. Even no local office for tourist information is available.

4. Problems

4.1 City Structure and Built Form

Most of the problems occurring at present time in Zarqa are due largely to unplanned growth happened before laying down the skeleton map of 1976. The mixed Landuse, the irregular grouping of buildings and the absence of setbacks are among those occurring in city center.

The high density and the undefined skyline is also evident in earlier growth of Zarqa before 1976.

The lacking of car-parking areas in all parts of Zarqa, even in new development is one of the major problems of the city structure.

Zarqa urban tissue is a mixture of regular and irregular patterns adjacent to each other. This in addition to large industrial buildings to worth of Zarqa skyline.

4.2 Infrastructure

A focus upon three main issues will be discussed in this paper only. The water and sewage systems, and the road network. All other utilities such as electricity and communication is not of great importance to the aim of this research.

4.2.1 Water Supply

Jordan is considered the seventh country in the World that suffers from the lack of water. Zarqa depends mainly on ground water to supply the city for all the purposes of residential and industrial uses. A total of 33.6 million cubic meter per month is produced from Zarqa ground water. This constitutes about 11.7% of Jordan's monthly consumption. (Water sewage authorization, 1995).

The supply network of water inside Zarqa is divided into two parts: the old and bad network in city commercial center and some residential districts which is inefficient, and the new and good network built after 1984 which is in good shape and condition. (Ministry of Building, 1995).

4.2.2 Sewage System

The sewage network in Zarqa collects both the rainwater and sewage. Its flow is by natural earth gravity in addition to some bridges and channels that help the liquid to reach Kirbat Al-Samra purification plant located north of Zarqa. It was built in 1985 to treat some 70,000 cubic meter daily. Its main purpose was to treat both Amman and Zarqa

sewage due to some difficulties in Amman purification plant unit (Water and Sewage Authorization, 1995).

The industrial liquid sewage of Zarqa is also treated in Kirbat Al-Samra purification plant with minor treatment from the factories. Nowadays more than double its capacity is collected and treated in much less period required for treatment (State Environmental Department, 1995).

4.2.3 Road network

Road network ratio consist 27% of the total area of Zarqa. (fig. 5). It is estimated to be around 7,744 square Kilometers. Most of the road network lacks the hierarchy in its design especially before the year of 1976. More than 40% of the roads in Zarqa is 15 meter wide and about 20% is 5 meter wide. The mixed landuse alongside roads is also evident in Zarqa. One street might start with commercial use, passes through residential area and ends with offices. (Zarqa Municipality, 1995).

Too many different types of vehicles drive on one single road. Heavy vehicles, public transport, buses, private cars and cycles might all be in one road. The lack of pedestrian routes is also evident in city center.

4.3 Pollution

The large number of factories within Zarqa and around its boundaries cause a large problems in terms of the air and visual pollution. This as well as the existence of Kirbait Al-Samra purification plant that poluts not only the air but the ground water for the whole Zarqa region and Zarqa River.

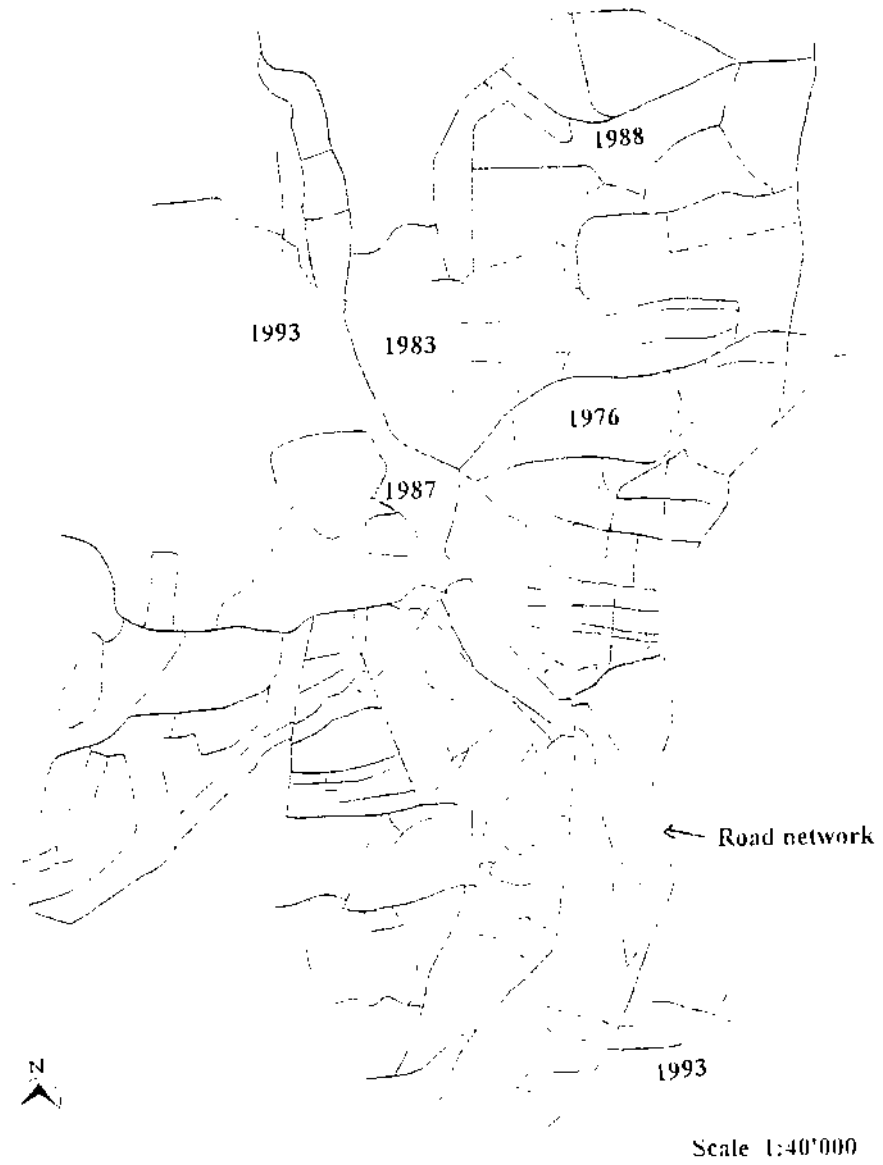


Fig (5) Road Network of Zarqa
Source: Zarqa Municipality, 1994

The presence of the solid waste disposal area for Amman, Zarqa and Al-Rusafia is to the south of Zarqa alongside the main road connecting Amman to Zarqa. The treatment for this waste collected from houses and factories is primitive and the smoke after firing solid waste pollutes the environment. (Fig. 6)

Factories also produce a lot of industrial chemical that are liquidated and treated in Kirbat Al-Samra without prior treatment. The vapour products of factories also cause the acid rain to fall during winter that has bad results on agricultural products (Zarqa Municipality, 1995)

4.4 Transportation

The missing hierarchy in the road network and the lacking of car parking areas are among the biggest problems in Zarqa

The uncontrolled zone for vehicles movement, where heavy trucks, public transport, buses, private cars and cycles use the same road cause a traffic congestion and rise the percentage of accidents. The lack of pedestrian areas and walkways is also seen in Zarqa. The present situation of road network is bad in terms of design and condition due to irregular maintenance and lack of financial support. Amman- Zarqa road is among the busiest roads in Jordan and its wide and design is insufficient.

5. Conclusions and solutions

5.1 Regional Dimension

Zarqa, the first industrial city in Jordan, should stop any future expansion in its industrial zone within and around its boundaries. A new zone for industry should be planned between Zarqa and Sahab, the industrial belt within and around its boundaries.

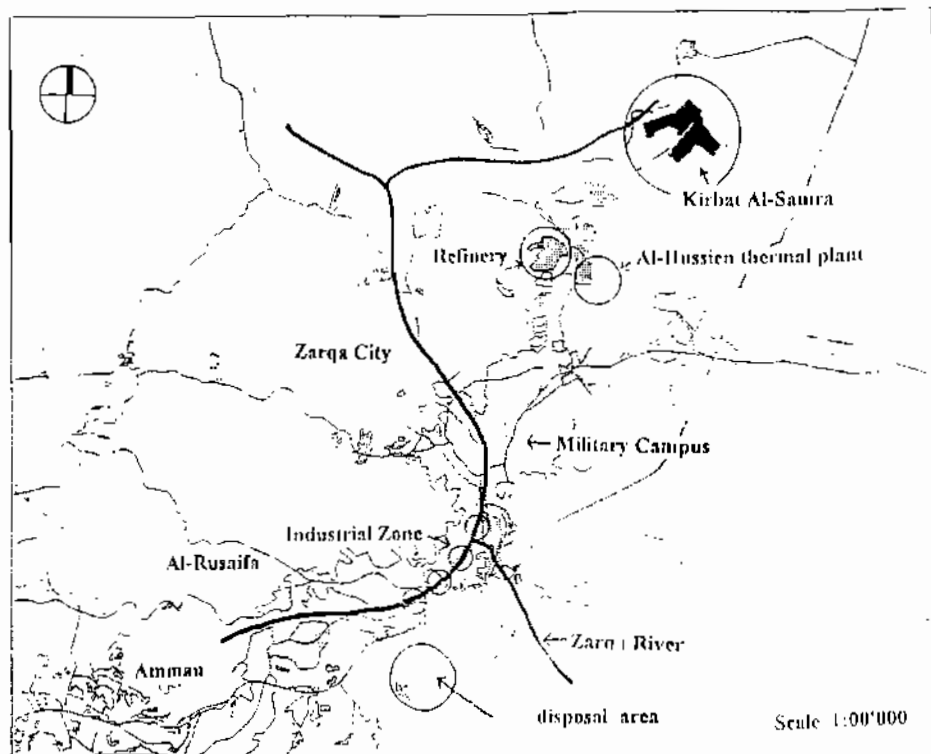


Fig (6) Sources of Pollution in Zarqa
Source: Zarqa Municipality, 1994

Most of the problems occurring in Zarqa is the result of solving the problems of Amman in Zarqa location. The purification plant of Zarqa, industrial zone on earlier stages before erecting Sahab eastern of Amman, and the generation of electricity to supply Amman are all problems facing Zarqa today.

A relocation of the Military campus existing eastern of Zarqa should facilitate future expansion to Zarqa and will reduce planning problems occurring in Zarqa.

A green zone should be planned around Zarqa, especially around industrial zone and purification plant to reduce air and visual pollution.

A new generator for producing electricity to Amman should be erected outside Zarqa city and near the new industrial zone suggested between Zarqa and Sahab.

The present generator, Al-Hussien thermo plant, will provide the near and future needs for electricity in Zarqa.

A new purification plant for Amman should be built, to treat water and sewage, outside Zarqa, or a rebuilding to the present plant at Ein-Ghazal should be done.

These recommendations are of urgent need to solve the bad situation of Zarqa nowadays.

5.2 City Dimension

A new commercial zone should be planned to east and west of the city after relocating the military campus.

A redesign of road network by suggesting controlled zones for light vehicles only should be planned inside Zarqa. A design for a new road to the eastern section of the city that connects Al-Rusaifa town and the

industrial zone south of Zarqa to the northern section of Zarqa where the Refinery, the purification plant and the electricity generators existed. This should help in reducing traffic congestion and accidents. A new motorway should be designed to link Amman and Zarqa or a widening to the widening existing road is a must. Al-Hijaz railroad might be reused to establish such a link as the main infrastructure for that is existed.

A provision for car parking areas within the city of Zarqa near the commercial zone and pedestrianization of some roads would help solving the inner problems of Zarqa structure. A relocation of some governmental offices outside the city center might also reduce congestion.

A new law for controlling the air pollution coming from factories should be introduced to reduce pollution. A new ways for treating solid, liquid and water disposal in the site south of Zarqa by using modern techniques and technologies should be taken into consideration.

A large budget should be planned to Zarqa Municipality to solve some of its problems while planning other solutions.

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