

THE HASHEMITE KINGDOM OF JORDAN

MINISTRY OF PLANNING

IN ASSOCIATION WITH

WATER AUTHORITY OF JORDAN

HYDROGEOLOGICAL AND WATER USE  
STUDY OF THE MUJIB WATERSHED

FINAL REPORT

APPENDIX (I)

JULY 1987

JAPAN INTERNATIONAL COOPERATION AGENCY

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HYDROGEOLOGICAL AND WATER USE STUDY

OF

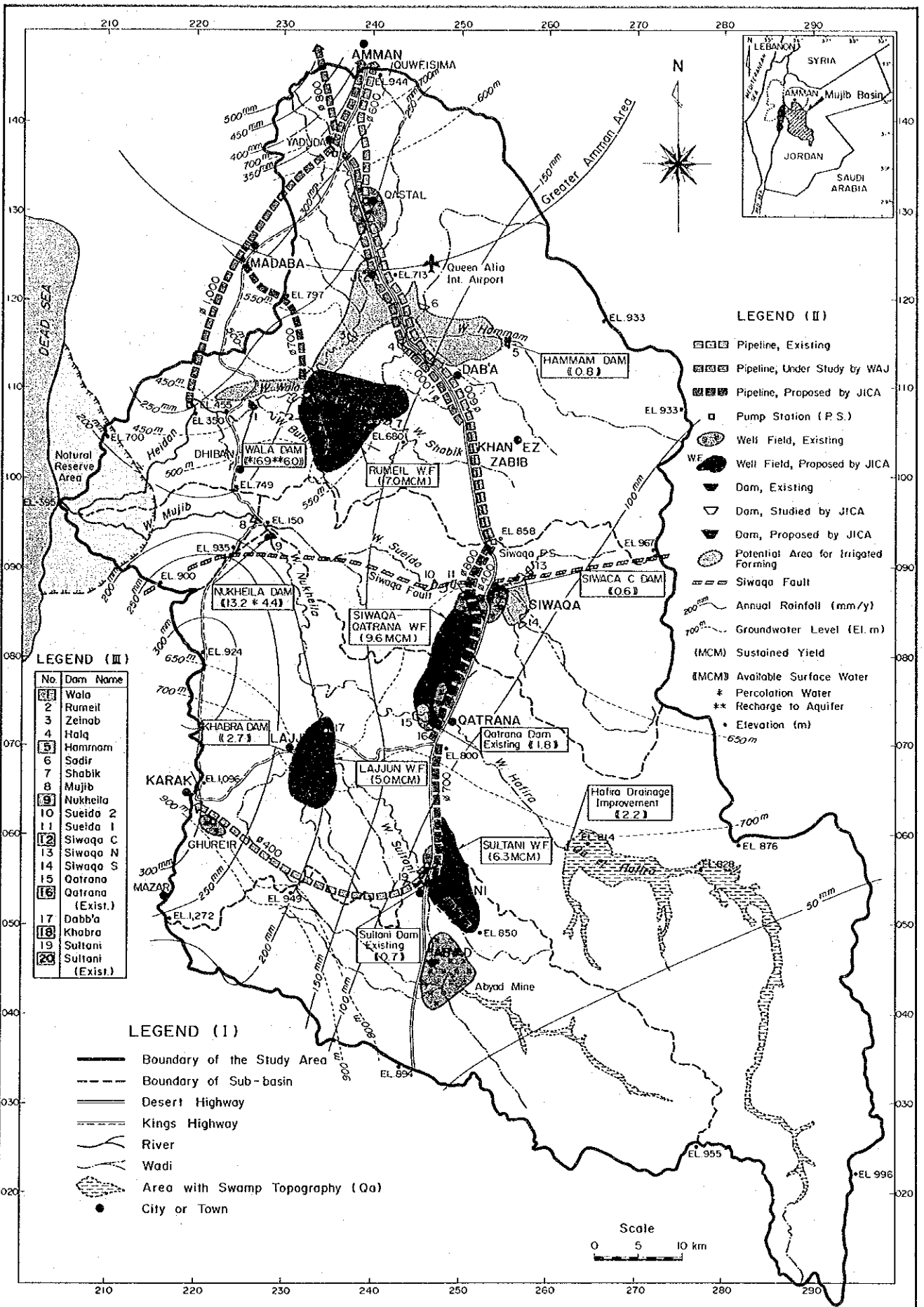
THE MUJIB WATERSHED

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  - E. ENGINEERING GEOLOGY
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ON FEASIBILITY LEVEL







**LEGEND (III)**

| No. | Dam Name          |
|-----|-------------------|
| 1   | Wala              |
| 2   | Rumeil            |
| 3   | Zeinab            |
| 4   | Halq              |
| 5   | Hammam            |
| 6   | Sadir             |
| 7   | Shabik            |
| 8   | Mujib             |
| 9   | Nukheila          |
| 10  | Sueda 2           |
| 11  | Sueda 1           |
| 12  | Siwaqa C          |
| 13  | Siwaqa N          |
| 14  | Siwaqa S          |
| 15  | Qatrania          |
| 16  | Qatrania (Exist.) |
| 17  | Dabb'a            |
| 18  | Khabra            |
| 19  | Sultani           |
| 20  | Sultani (Exist.)  |

- LEGEND (I)**
- Boundary of the Study Area
  - - - Boundary of Sub-basin
  - Desert Highway
  - Kings Highway
  - River
  - Wadi
  - Area with Swamp Topography (Qa)
  - City or Town

- LEGEND (II)**
- Pipeline, Existing
  - Pipeline, Under Study by WAJ
  - Pipeline, Proposed by JICA
  - Pump Station (P.S.)
  - Well Field, Existing
  - Well Field, Proposed by JICA
  - Dam, Existing
  - ▽ Dam, Studied by JICA
  - ▽ Dam, Proposed by JICA
  - Potential Area for Irrigated Farming
  - Siwaqa Fault
  - Annual Rainfall (mm/y)
  - Groundwater Level (EL.m)
  - (MCM) Sustained Yield
  - (MCM) Available Surface Water
  - \* Percolation Water
  - \*\* Recharge to Aquifer
  - Elevation (m)

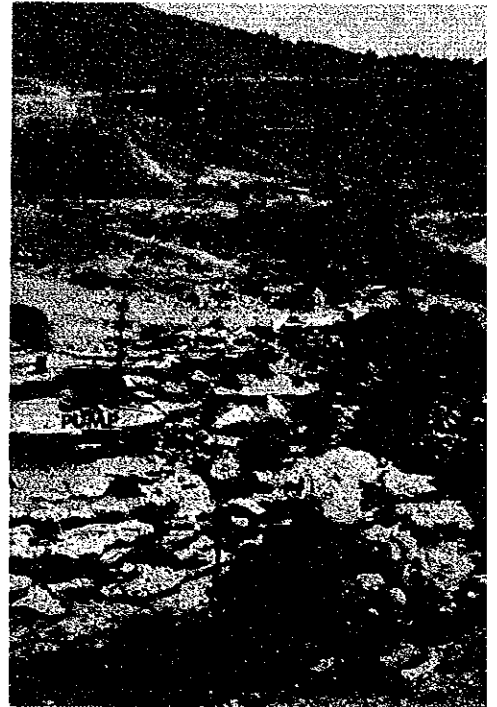
# THE MUJIB WATERSHED

THE HASHEMITE KINGDOM OF JORDAN  
 HYDROGEOLOGICAL AND WATER USE  
 STUDY OF THE MUJIB WATERSHED  
 JAPAN INTERNATIONAL COOPERATION AGENCY





Wadi Mujib (View from Dhiban)



Small Spring in Wadi Heidan  
(200m eastward from Wala bridge)



Flush Flood in Wadi Sueida (at Siwaqa bridge)  
Date : 8 Nov. 1986



Qatrana Existing Dam



## LIST OF ABBREVIATIONS

|                           |   |  |
|---------------------------|---|--|
| JICA                      | = | Japan International Cooperation Agency |
| Government                | = | Government of Jordan                   |
| MOP                       | = | Ministry of Planning                   |
| WAJ                       | = | Water Authority of Jordan              |
| JVA                       | = | Jordan Valley Authority                |
| MOA                       | = | Ministry of Agriculture                |
| NRA                       | = | Natural Resources of Authority         |
| RSS                       | = | Royal Scientific Society               |
| JNGC                      | = | Jordan National Geographic Center      |
| JEA                       | = | Jordan Electricity Authority           |
| JEPCO                     | = | Jordan Electric Power Company          |
| S/W                       | = | Scope of Work                          |
| C/P                       | = | Counterpart Personnel                  |
| M/P                       | = | Master Plan                            |
| Pre-F/S                   | = | Pre-feasibility Study                  |
| F/S                       | = | Feasibility Study                      |
| KV                        | = | Kilo Voltage                           |
| KW                        | = | Kilo Watt                              |
| KVA                       | = | Kilo Voltage Ampere                    |
| sq.km or km <sup>2</sup>  | = | Square Kilo Meter                      |
| lit/s                     | = | Liter per Second                       |
| cu.h or m <sup>3</sup> /h | = | Cubic Meter per Hour                   |
| cu.s or m <sup>3</sup> /s | = | Cubic Meter per Second                 |
| cu.d or m <sup>3</sup> /d | = | Cubic Meter per Day                    |
| bs/ft                     | = | Pound per Foot                         |
| MCM                       | = | Million Cubic Meter                    |
| MCM/y                     | = | Million Cubic Meter per Year           |
| MCM/m                     | = | Million Cubic Meter per Month          |
| O & M                     | = | Operation and Maintenance              |
| M & I                     | = | Municipal and Industrial               |
| API                       | = | American Petroleum Industry            |
| ha                        | = | Hectare                                |



THE HASHEMITE KINGDOM OF JORDAN  
MINISTRY OF PLANNING  
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WATE AUTHORITY

LIST OF APPENDIX

- A. SOCIO ECONOMY
- B. HYDROLOGY
- C. GROUNDWATER RESOURCES
- D. MUNICIPAL WATER SUPPLY PLANNING
- E. ENGINEERING GEOLOGY
- F. DAM PLANNING
- G. AGRICULTURE





***APPENDIX A***

***SOCIO ECONOMY***



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## 1. ECONOMIC BACKGROUND

### 1.1 National Economic Background

#### 1.1.1. General

The Hashemite Kingdom of Jordan is one of countries in the Middle East Arab and extends from 29 degrees to 33 degrees of north latitude and from 35 degrees to 39 degrees of east longitude. The country which covers an area of about 89,200 sq. km is bounded by Syria on the North, by Iraq on the East, by Saudi Arabia on the Southeast and by Israel on the West.

More than 80% of the country land is covered by a desert land which has a little utility value. Majority of Jordanian population (about 2.7 million in 1985) inhabits in the remaining area which has a high growth in population including the forced migration from the West Bank and the Gaza Strip due to Israeli occupation.

In Jordan, the fertile land for agricultural use is the area by the Jordan River and the Dead Sea, and it corresponds to an area of 7% of the country. Therefore, major crops of wheat, barley, potato, etc. had to rely on import, except export goods such as tomato, cucumber and other some fruits.

Jordan, which has a relatively high growth in population and a little suitable land for agricultural use and is not a oil-producing country, is in financial difficulties. To relieve such difficulties, the Government has made strenuous efforts toward increase in export commodities by promoting the development of industry, improving the agricultural technology and rising the education level.

While, water which is essential for the development of industry and agriculture is so scarce resources in Jordan as to be insufficient even water supply for domestic purpose. Therefore, the development of water

resources is an important problem by which Jordan is confronted not only to ensure the domestic water, but also to promote the development of industry and agriculture.

Exports of Jordan are represented by phosphate rock, potash and fertilizers which correspond to about 50% of the total exports (JD 255 million) in 1985. On the other hand, imports in the same year amounted to about JD 1,075 million which exceeded exports by JD 820 million. Such a situation of trade deficits has occurred every year during the recent five years, but a great part of the deficits has been covered by the remittances of Jordanians working abroad and by financial aid from abroad, especially from Saudi Arabia.

In view of such a fact, the greater cooperation and a further strengthening of economic relations between Jordan and other Arab countries will necessitate from now on through the provision of skilled Jordanian workers and the proper use of Arab financial aid in order to achieve the desired economic stability and development of Jordan.

#### 1.1.2 GDP and GNP

In 1985, Gross Domestic Product (GDP) of Jordan was JD 1,359 million at factor cost and JD 1,581 million at market prices. A difference between the factor cost and market prices in GDP shows a total of indirect tax revenues of the Government, corresponding to 14% of GDP at market prices. Gross National Product (GNP) in the same year was JD 1,856 million including the net factor income of JD 275 million from abroad. The per capita GNP reached about JD 689 which takes a high rank among developing countries (see Table A-1).

At the beginning of the 1980's, the Jordanian economy showed a fairly high growth, but the growth rate has trended downward since 1982 due to the economic recession in the world. In 1985, GDP and GNP at current market prices showed the growth rates of about 6.1% and 0.6% respectively, while the real growth rate was 3.0% for GDP and -2.3% for

GNP.

The per capita GNP maintained an average growth rate of 5.2% per annum at current market prices during the period from 1980 to 1985, while the real growth rate was -0.2% per annum on average during the same period. In 1985, the growth rate recorded a negative figure, namely, -3.0% at current market prices and -5.9% at the 1980 constant market prices (see Table A-2).

The contribution of each economic sector to GDP at factor cost showed a little change during the period from 1980 to 1985, namely, the contributions of productive and services sectors changed from 39.0% and 61.0% in 1980 to 36.5% and 63.5% in 1985, respectively. The share of productive (or services) sectors trended downward (or upward) every year since 1981 (see Table A-3). The contribution of mining and manufacturing industrial sector, the most conspicuous among the productive sectors, fell from 20.0% in 1981 to 16.4% in 1985. The share of agricultural sector ranged from 7% to 9% during the same period. The services sectors were led by both sectors of trade and government services which had the share of 18% or more either of them.

During the period 1981-1985, the service sectors in GDP maintained the high growth rate of 10% or more at current prices every year, but the growth of GDP trended downward as a whole due to the decline of growth in the productive sectors, except agriculture, electric power and water supply. The agricultural sector which had a share of about 8% to GDP achieved an average annual growth rate of 13% during the same period and 17% in 1985. Despite the electric power and water supply sectors were among the lowest contribution (below 3%) to GDP in the whole sectors, they also showed a high growth at the average annual rate of over 15% during the same period and about 7% in 1985 (see Table A-4).

### 1.1.3 Agricultural Production

Agricultural crops of Jordan, as shown in Table A-5, are represented by tomatoes, cucumbers, eggplant, wheat, olive and citrus fruits. Among them, tomatoes are the most important crops as the export goods and their production in 1985 amounted to about 410 thousand tons, corresponding to increase in about 100% against the average annual production of about 200 thousand tons during the period from 1980 to 1984.

Besides tomatoes, production of vegetables such as cucumbers, eggplant, melons, cauliflower and cabbage showed also remarkable increases in 1985 owing to the good harvest on the one hand and due to increases in acreage and in the productivity of land brought by advanced cultivation techniques on the other.

The production of wheat, which is the staple food for Jordanian people, ranged between 50 thousand tons and 140 thousand tons per annum for the period from 1980 to 1985, depending upon the amount of precipitation in those years. For example, the domestic production of wheat was 50 thousand tons in 1984 and 63 thousand tons in 1985, while its imports amounted to 450 thousand tons and 380 thousand tons in 1984 and 1985 respectively.

In general, most of the agricultural productions of Jordan varied considerably every year, that is, there was not a regularity in terms of the growth in production (see Table A-6). Accordingly, it is hereupon required to promote a stabilized growth in production by developing water resources and by introducing advanced cultivation techniques. A detailed description on the agricultural production is given in Appendix G .

#### 1.1.4 Industrial Production

During six years from 1980 to 1985, the industrial sector (including mining) achieved a remarkable growth which rose by 73% (at average annual rate of about 10%) in the overall index number of the production, owing to the increased production of major products such as cement and phosphates (see Table A-7). Phosphate which is one of the most important products achieved the production of 6,200 thousand tons in 1984 and 6,100 thousand tons in 1985 and played a great role for earning the foreign currency (see Table A-8).

According to the recent trend of industrial production, although there was a decline in productions of some industries such as iron and leather, it is expected that the Jordanian industry will maintain a fairly high growth for the time being on the whole, being supported with phosphate industry and newly-developed industries such as chemical acids, fertilizers and potash. The detailed description on industrial products is given in Sections 4.1 and 4.2.

#### 1.1.5 Price Index

Jordan has kept the stability of prices for the last few years, reducing gradually the rate of price escalation, namely, the rise in consumer price was by only 3.0% in 1985 against 7.7% in 1981, and the average annual increase rate was 5.4% during five years from 1981 to 1985. In terms of individual components of consumer prices, for example, the price index of food which had a great relative weight of 42% rose by only 2.2% in 1985 and 3.9% at the average annual rate during the same period. The consumer price indices of other components are shown in Table A-9.

The wholesale price has also continued the stability since 1981; its index recorded a slight increase of 1.5% in 1985 and 3.9% at the average annual increase rate during the same period. The wholesale price index of construction materials which have the maximum relative

weight of 24% in the whole items recorded the zero growth in 1985 and rose by only 1.1% at the average annual rate during the same five years. The wholesale price indices of other components are shown in Table A-10.

Judging from trends of consumer and wholesale prices in the last five years, it is expected that Jordan will maintain the price stability for the time being.

#### 1.1.6 External Trade

In 1985, the external trade of Jordan amounted to JD 1,385 million, composed of exports of JD 311 million (including re-exports) and imports of JD 1,074 million. The imports maintained around JD 1,100 million per annum with a little difference every year since 1981, on the other hand the exports showed a great increase since 1984; JD 291 million in 1984 against JD 211 million in 1983 (see Table A-11).

Such a remarkable improvement in export performance was mainly due to the increase in exports to Iraq and the rise in both the prices and quantity of exports of phosphates, fertilizers and potash. Nevertheless, the imports exceeded the exports by JD 780 million in 1984 and JD 760 million in 1985, namely, the imports accounted for approximately 80% of all the external trade in both years.

In 1985, domestic exports (except re-exports) amounted to JD 255 million which consisted of the industrial production (including the mining production) of JD 212 million (or 83%), the agricultural production of JD 44 million (or 17%). Of the industrial products, exports of phosphate rock, fertilizers and potash reached JD 66 million, JD 31 million and JD 31 million, respectively. The exports of the above three products accounted for about 60% of the total exports of industrial and mining products. Agricultural exports were represented by tomatoes, citrus fruits and cucumber, but exports in 1985 were only JD 6.1 million, JD 5.9 million and JD 3.0 million, respectively (see Table A-12).

During six years since 1980, Arab countries maintained their position as the leading market for the Jordanian external trade. In particular, Arab Common Market countries took usually the first place in exports and accounted for 29% of the total exports in 1985. Arab countries other than Arab Common Market, India and Socialist countries formed 23%, 18% and 8% of the total exports, respectively (see Table A-13). In terms of individual countries, Iraq ranked first and the exports for Iraq in 1985 reached JD 65.8 million or 26% of the total exports. The second and third were India and Saudi Arabia which formed 18% and 15% of the total exports, respectively.

As for imports, in 1985, E.E.C., Arab countries and U.S.A. formed 29%, 24% and 12% of the total imports, respectively. Among Arab countries, Saudi Arabia which was a main supplier of crude oil for Jordan maintained the position as the leading supplier of Jordan's imports and provided commodities of JD 159 million or 15% of the 1985 imports.

#### 1.1.7 International Balance of Payments

The international payments of Jordan have been confined to a little unfavorable balance every year since 1980, despite a great deficit in the external trade, owing to remittances from Jordanians working abroad and foreign aid receipts. In 1985, the balance of payments was a deficit of JD 38 million (see Table A-14).

The remittances from Jordanians working abroad in 1985 amounted to JD 403 million corresponding to 53% of the trade deficit (JD 762 million). On the other hand, the foreign aid receipts in the same year reached JD 318 million covering 77% of the unfavorable balance of goods and services (JD 415 million), and overwhelming portion of the aid receipts was the transfers received from Saudi Arabia. Accordingly, it will not be too much to say that the international payments of Jordan have been mainly constituted by three items; trade, remittances and foreign aid receipts.

### 1.1.8 Government Budget

In 1985, the Government budget of Jordan amounted to JD 842.45 million for the public revenues, comprising domestic revenues of JD 434.46 million, external revenues of JD 396.37 million and other revenues of JD 11.62 million. On the other hand, the public expenditures in the same year reached JD 818.77 million which consists of current expenditures of JD 541.96 million and capital expenditures of JD 276.81 million. Although the balance in 1985 was a surplus of JD 23.68 million, during the period from 1980 to 1984, the Government budget continued a little deficit every year, as shown in Table A-15.

### 1.1.9 Economic Development Plan

The Government of Jordan formulated the Third Five-Year Development Plan for the period from 1986 to 1990, taking into account the actual economic growth trends in the period of the Second Five-Year Plan (1981-1985) and prospects of long-term economic development by the year 2000.

The Second Five-Year Plan was formulated in an optimistic atmosphere, assuming that Jordanian economy would continue such a high growth as indicated during the period 1975-1980. While, the actual economic performance fell below the plan's projections leading to a decline in domestic and external demand due to negative trends in the economies of the Gulf states and the recession in the world economies since 1982. For example, the average annual growth rate of GDP (at factor cost) in real terms during the plan period (1981-1985) was 11.1% for the planned figure and 4.2% for the actual one. Planned and actual figures on other economic indicators in the Second Plan together with the growth rates planned in the Third Plan period are summarized in the following table. The detailed figures on economic indicators in the Third Plan are given in Table A-16.



Average Annual Growth Rates in Real Terms during  
the Second Plan Period (1981-1985) and Average Annual  
Growth Rates Planned for the Third Plan Period (1986-1990)

| Item                                  | 1981-1985 Plan |            | 1986-1990 Plan |
|---------------------------------------|----------------|------------|----------------|
|                                       | Planned        | Actual     | Planned        |
| 1. GDP (at factor cost)               | 11.1           | 4.2        | 5.1            |
| 2. Net indirect taxes                 | 11.0           | 15.8       | 9.2            |
| 3. GDP (at market prices) (1+2)       | 11.1           | 5.3        | 5.7            |
| 4. Imports of Goods<br>and Services   | 13.7           | 2.9        | 2.7            |
| 5. Total Available<br>resources (3+4) | <u>12.5</u>    | <u>4.2</u> | <u>4.3</u>     |
| 6. Consumption                        | 8.0            | 4.7        | 3.2            |
| 7. Investment                         | 12.2           | 0.8        | 5.3            |
| 8. Exports of Goods and Services      | 21.7           | 3.4        | 6.1            |
| 9. Total Uses (6+7+8)                 | <u>12.5</u>    | <u>3.5</u> | <u>4.3</u>     |

Source: Five Year Plan for Economic and Social Development  
1986-1990, Ministry of Planning, Jordan

The Third Five-Year Development Plan is instituted with the following seven overall targets;

(1) Realization of the GDP and GNP Growth Rate of 5% per Annum

The Plan is designed to increase the real GDP at factor cost by JD 1,739 million in 1990 (at the 1985 constant prices) against JD 1,359 million in 1985 at an average growth rate of 5% per annum, and also to increase the real GNP at market prices by JD 2,367 million in 1990 against JD 1,856 million in 1985 at the same growth rate. As a result, the real GDP per capita will be increased from JD 509 in 1985 to JD 543

in 1990 at a growth rate of 1.3% per annum, and the real GNP per capita will also be increased from JD 695 in 1985 to JD 739 in 1990 at a growth rate of 1.2% per annum.

(2) Creation of New Employment Opportunities

The Plan is designed to create new employment opportunities in all economic sectors with the aim of the reduction of unemployment and the improvement of disequilibrium in the labor market. The Plan envisages to create new jobs of 97,000 through investments to respective social and economic sectors, and as a result it is expected that the employment will aggregate to 703,000 persons in 1990.

(3) Proportionality of Consumption and Income

The Plan aims at realizing the GDP growth at a higher rate than that of the overall consumption so as to have the reduction in a ratio of real consumption to GDP at market prices from 111% in 1985 to 99% in 1990.

(4) Increase of Domestic Revenues and Rationalization of Current Government Expenditures

The Plan is designed to increase revenues of the Government and to curb the increase in its current expenditures so that the former may cover the latter by 1990. A ratio of the domestic revenues to the current expenditures is expected to rise from 80% in 1985 to 100% in 1990.

Besides, the following three items are set up as the important targets in the Plan; (5) Reducing the Deficit in the Balance of Goods and Services, (6) Fostering Joint Arab Economic Action, and (7) Ensuring Regional Distribution of Development Benefits.

## 1.2 Regional Background

### 1.2.1 Greater Amman Area

The Study Area is composed of the Greater Amman area and the Wadi Mujib watershed. The Greater Amman area, which is defined as an area within 30 km with centre in the Amman city, stretches administratively over four governorates; Amman, Zarqa, Balqa and Irbid Governorates. It includes industrial and commercial cities such as Zarqa, Ruseifah, Salt and Madaba, and had a population of 1.6 million in 1985, corresponding to nearly 60% of the whole population of Jordan.

The Amman city, which became a capital of Jordan in 1923, is situated at the junction of important trade route linking between Egypt and the Middle-East countries, and in 1985 had a population of about 800,000. It is, in common with capital cities in the world, a centre of government of the country as a whole and of all the diplomatic and commercial activities.

Except potash industry, most of Jordan's industries masses in the Greater Amman area, especially Amman-Reseifah-Zarqa zone, and this area is particularly expected to achieve the more development of various industries during the Third Plan period (1986-1990). For the purpose of encouraging the development of light and medium industries, the Government established industrial estates with suitable infrastructures and service facilities in such regions as Amman, Salt, Irbid and Aqaba. Of these estates, the Amman industrial estate finished the first stage of its construction in 1984 and the remainder is expected to be completed by the end of 1987. The project cost is estimated at JD 7 million in total. As for the Salt industrial estate, implementation of the project is planned to start at the beginning of 1988.

The urbanization in this area will be further promoted as a result of encouraging the establishment of industries and the great growth in population supported by high birthrate and migration. It is expected

that the Great Amman area will have a population of about 3.4 million corresponding to 67% of the total population of Jordan in 2005. Such rapid urbanization, on the other hand, will cause the more serious problems in terms of water supply, transportation, etc.

At present, municipal water supply in this area depends chiefly upon groundwater which lies below the Amman-Zarqa zone and water supplied by pipelines from Azraq oasis and from Quastal, Siwaqa and Qatrana well fields in the Mujib basin. Among them, the groundwater in the Amman-Zarqa zone is already nearing a limit in terms of both quantity and quality. In addition, water consumption in this area is expected to increase fairly in the future due to the rapid growth in urbanization as mentioned above. In view of such situation it is urgently required to secure the suitable water sources to meet the future demand in this area.

The transportation in Jordan depends exclusively on road and its main network is centred in the Greater Amman area, especially Amman-Zarqa conurbation. It is expected that traffic volume on primary roads in this area will reach from about 10,000 vehicles per day in 1985 to 15,000 or more vehicles per day in 1990 as a result of the aforementioned rapid urbanization. To cope with such increased traffic volume, the Third Five-Year Plan envisages some road improvement and construction projects. For example, construction of the Amman outer ring-road is projected with the aim of improving the flow of traffic and moving transit traffic away from congested areas in the Amman city. The implementation will be made during four years from 1989 to 1992. As another project, the Government has the construction project of a terminal in the eastern part of Amman for overland transport. This terminal, which provides the maintenance of vehicles and other related services, is also needed to cope with the increased traffic volume. This project will take two years to complete from start in 1987.

The Greater Amman area which has more than 80% of the labor force markets in the whole country represents the labor force of Jordan. The size of labor force in Jordan rose from 218,000 in 1961 to 405,000 in

1979 and further to 502,000 in 1985. During the period from 1961 to 1985, the average annual growth rate of labor force in Jordan was 3.5% which is fairly compared with that of population (4.6%). This was mainly due to a rise in the ratio of population under 15 years of age and an increased enrollment at all educational levels. According to statistical data, the rate of participation in the labor force declined from 24% in 1961 to 22% in 1979 and then to 21% in 1985. On the other hand, the unemployment rate in Jordan rose during the last decade, namely, 2% in 1976, 6.7% in 1982 and is estimated at about 8% in 1985. Such increase in unemployment would be mainly due to the economic recession during the above period.

According to a forecast of the Government, the total additional demand for Jordanian manpower will be about 20 thousand during the period 1986-1990. A comparison between additional supply and additional demand during the same period shows an expected surplus in the labor force of 66 thousand. As a result, the unemployment will be further increased and it is expected to be concentrated in production workers as well as among specialists and technical staff. In view of such condition of labor force, the government aims, in the Third Five-Year Plan, at achieving a labor balance, increasing the employment opportunities for workers through the creation of new jobs, the encouragement of increase in industrial production and other various programs. A great portion of such programs will be implemented in the Greater Amman area. In addition, to formulate a comprehensive development plan for the Greater Amman area, the Government is carrying out socio-economic and technical studies in the area.

### 1.2.2 Mujib Watershed

The Wadi Mujib basin is located in the south of the Amman city and a part of its northern region is included in the Greater Amman area. The Mujib river system consists of Wadi Wala and Wadi Mujib, and its catchment area is about 6,800 km<sup>2</sup>.

Administratively, the Mujib basin stretches over three governorates; Amman, Karak and Ma'an Governorates, and it has the advantage of transportation owing to two primary roads; Desert Highway and Kings Highway which run through this basin from north to south.

In the basin, the desert land covers more than 80% of the total area and the remainder is used as agricultural and residential areas, forest and others. In 1985, the basin had a population of about 80,000 at an average rate of 12 persons per sq. km, i.e., sparsely populated region, and although it has some communities such as Na'oor, Jiza, Dieban, Qasr and Mazar, the population of respective communities was less than 10,000 in the same year.

Such a depopulation in the basin resulted from that there are no striking industries, except phosphate industry, and most of industries have hesitated extending their business to the basin due to a little rain, ranging from about 300 mm per annum in the western part of the basin to less than 50 mm per annum in the eastern part (desert land).

In the basin which has a few industry, Abiad phosphate mine which is located in the southern region of the basin is one of the most important industries of Jordan, and produced the phosphates of about 150 million tons in 1985. Hassa mine, which lies outside the basin boundary at about 30 km to south of the Abiad mine, produced phosphates of about 300 million tons in the same year.

Both mines are operated by the Jordan Phosphate Mines Co. Ltd. and have about 2,200 workers in total, consisting of 600 workers at Abiad and 1,600 workers at Hassa. The Company envisages the rise of phosphate production by strengthening the mine equipment and by improving the production method for these mines during the Third Five-Year Plan period, and expects the increased production of phosphates of about 300 million tons per annum furthermore in total at the both mines by the end of 1990.

Agriculture in the basin is characterized by a highland agriculture which depends on rainfed, except a little irrigation. Major crops planted in the rainfed area are wheat, barley and tobacco. Of these crops, wheat covers more than 90% of the rainfed area, but its productivity is very low, namely, less than 0.1 tons/ha.

Majority of vegetables such as tomato, eggplant, cucumber, and cauliflower are planted in the irrigated area and tomato plantation covers an area of about 60% of the vegetables' land.

Besides, olives and grapes are representative of tree fruits in the basin, and they have unit yield of 1 ton/ha and 4 tons/ha respectively, namely, near the national level. In the northern part which is much rain relatively in the basin, they are mainly produced in the rainfed areas, while in the southern part, they are planted in the irrigated areas.

In 1984, domestic animals in the basin counted sheep of about 430,000, goats of about 120,000, cows of about 3,500 and poultries of about 5 million. The average holding number per family is estimated at sheep of 20, goats of 10 and poultries of 200.

About 80% of agricultural land in the basin is cultivated by landowners and the remaining 20% is used by tenants. Farm size per family is about 10 ha on average, but more than 50% of landowners holds an area of below 2 ha.

The Third Five-Year Plan is designed to achieve a more socio-economic development of Jordan through an overall regional development plan which takes into account the special socio-economic conditions of the different regions. In the light of such target of the Plan, development of the Mujib basin, taking into account the existing conditions of the basin, would be to give priority to the developments of mining industry and highland agriculture, and to the expansion of infrastructure.

As for the mining industry, the increase in production of phosphates, which have made a great contribution to obtain foreign currencies, is regarded as the most important matter. In addition, development of the highland agriculture is essential for developing the basin, and it will be attained by developing the agricultural systems and by enhancing the productivity in the rainfed areas through introduction of the advanced techniques.

To increase the production of phosphates and agricultural crops, more water is an essential resource. Water in the basin, at present, is supplied to Amman for municipal purpose from Jiza, Siwaqa and Qantrana well fields and to Karak for domestic and irrigation purposes from the Sultani well field. Besides, the groundwater have been used for irrigation purpose in the basin and for industrial purpose at the Abiad Phosphate Mine. Water demand in the basin is expected to increase in the future, while water in the basin has a limit. Therefore, it is required as a pressing matter hereupon to formulate a rational distribution plan for water in the basin so as to make the balanced socio-economic development for industrial sectors and regions concerned.



## 2. ADMINISTRATION

The country, except West Bank, was administratively divided into five governorates (before 1985); Amman, Irbid, Balqa, Karak and Ma'an. Each governorate was further subdivided in order of districts, sub-districts and nahias. In the whole country, there were districts of 14 units, sub-districts of 26 units and nahias of 44 units, and these subdivisions were under the control of their immediate superior administrations (see Table A-17(1)).

In 1985 the Government made a change in administration divisions. As a result, number of governorates was increased from 5 units to 8 units. Amman governorate was divided into two governorates; Amman and Zarqa, and further Mafraq and Tafielah Governorates were born of Irbid and Karak Governorates, respectively. As for subdivisions; two administrative units designated as "city and localities" and "town and localities" were newly introduced instead of some of districts, sub-districts and nahias, and the administration system was simplified. As a result, number of divisions came to 10 units for "city and localities", 12 units for districts, 16 units for sub-districts, 15 units for nahias and 4 units for "town and localities". All of districts and "city and localities", except "Madaba city and localities" and "Aqaba city and localities", are connected directly with governorates concerned administratively. Some of sub-districts and nahias also are under the direct control of governorates concerned. The details of new administration divisions are shown in Table A-17(2).

The Study Area, as mentioned in Paragraph 1.2.1, consists of the Greater Amman area and the Mujib watershed. The former stretches four governorates; Amman, Zarqa, Irbid and Balqa, and the latter expands three governorates; Amman, Karak and Ma'an. Both areas overlap each other in the southern part of the Amman Governorate and have an area of about 9,100 sq. km in total, corresponding to approximately 10% of the country area. The Study Area includes major cities such as Amman, Zarqa, Ruseifa, Salt and Madaba, and it covers all or a part of 5 districts, 5 sub-districts and 5 nahias.

Each of district, sub-district and nahia contains some localities such as cities, towns and villages. According to the 1979 Census, Jordan had localities of about 1,020 in number, consisting of 20 cities, 70 towns and 930 villages. For convenience of population projections and estimates of water demand, in the present study, city, town and village are assumed at the locality of over 10,000 of population, 3,000 to 10,000 and below 3,000 respectively, according to a classification shown in "Water Sector Study Report 1984, World Bank". Among them, the Study Area contained 12 cities, 13 towns and about 780 villages in 1979 (see Table A-18).

### 3. POPULATION

#### 3.1 Population Statistics

Since the establishment of the Hashemite Kingdom of Jordan, the comprehensive population censuses in Jordan were conducted three times; Oct. 1952, Nov. 1961 and Nov. 1979. These censuses showed population of 568 thousand in 1952, 901 thousand in 1961 and 2,133 thousand in 1979 in the East Bank. During the two periods from 1952 to 1961 and from 1961 to 1979, the average annual rate of population growth was 4.89% and 4.91%, respectively. Such a great growth in population was mainly due to the increased migration and the high birthrate. Especially, Amman Governorate had the remarkable growth at an average rate of 5.69% per annum during the period from 1961 to 1979 (see Table A-19). While, the population density of Jordan was very low or about 90 persons per sq. km in 1979, because that more than 80% of the country land are covered by the desert land which has a little utility value.

According to the 1979 Census, population in the Study Area amounted to about 1,322 thousand corresponding to 62% of the total population of Jordan. It consists of 1,253 thousand in the Greater Amman area and 69 thousand in the Mujib basin, and more than 70% of population in the Greater Amman area inhabits in Amman, Zarqa and Ruseifa cities and their surrounding areas. Breakdowns of population by governorate, by kind of localities and by nahia are given in Tables A-20, A-21 and A-22, respectively.

The ratio of female to male of population in 1979 was 48 to 52 in the Study Area as well as the whole country, and it had a little difference among governorates except the Ma'an Governorate as shown in Table A-23. In the Ma'an Governorate, this ratio was 44 to 56, namely, male was the fairly larger population than female. This was mainly due to population of the Aqaba city which had the ratio of 39 to 61.

## 3.2 Labor Force

### 3.2.1 Manpower

In 1979, the population of 15 years or more of age in Jordan was about 1,030 thousand consisting of male of 530 thousand and female of 500 thousand. It corresponds to about 49% of the total population. The population of the said age group in the Study Area was about 65 thousand corresponding to 63% of that in the whole country. According to estimation by the Department of Statistics, in 1985 a share of the population of more than 15 years of age to the total population came to 52% which rose by 3% compared with that in 1979 in the Study Area as well as the whole country (see Table A-24).

### 3.2.2 Employment

Out of population of more than 15 years of age in Jordan in 1979, number of the employed amounted to some 406 thousand comprising male of 376 thousand and female of 30 thousand. A rate of the employed in the above age group showed about 70% for male, 6% for female and 40% as a whole. More than 90% of female of these ages was engaged in the housework without economic activity. These figures had a little difference among governorates as shown in Table A-25. Unemployment in Jordan was about 4% in 1979. However, it is on the increase since 1982 due to the recession in the world economies. In 1985, the unemployment was estimated at about 8%.

Table A-26 shows number of the employed by industrial origin in 1979. As is obvious from figures shown in the table, number of the employed in services sectors was considerably many compared with that in productive sectors, namely, it was about 255 thousand and 151 thousand (or 63% and 37%), respectively. Particularly, number of the employed in the public administration and defense sectors accounted for more than one third of the total employed, and in case of female it amounted to about two-third. Such a large number of the employed in services sectors is obviously abnormal. The Third Five Year Plan(1986-1990) then

envisages encouraging the growth in productive sectors to GDP to improve such a unfavorable situation to the national economy. As a result, it is expected that a ratio of productive sectors to services sectors in terms of contribution to GDP would be 60 to 40 by the end of the Plan period.

## 4. INDUSTRY

### 4.1 Mining Industry

In Jordan, phosphate and potash are the typical products in the mining sector. Phosphate has been produced at three mines; Ruseifa, El-Abiad and El-Hasa. The total production increased from 3,900 thousand tons in 1980 to 6,000 thousand tons in 1985 at the increase rate of 9.2% per annum. Majority of phosphate products was exported and has greatly contributed to the Jordan economy (see Tables A-8 & A-12). While, it is programmed that both mines of El-Hasa and EL-Abiad will be closed in 1990 and 1992 respectively because of decrease in phosphate reserves remained. On the other hand, instead of these mines, it is planned that the El-Shiddiyya mine located in the southern part of the El-Hasa mine will start the operation in 1988. The phosphate reserves of this mine are estimated at about 250 million tons.

Potash which follows phosphate among mining products in Jordan started its production in 1982 at the southern end of the Dead Seacost. The yearly output increased from 15 thousand tons in 1982 to 900 thousand tons in 1985. Potash also is an important export product in Jordan and its exports amounted to JD 31 million in 1985 (see Tables A-8 & A-12).

Besides, Jordan has some mineral resources such as plaster stone, silica sand, copper, manganese and oilshale. Among them, plaster stone and silica sand were respectively produced 120 thousand tons and 25 thousand cu. m in 1984 for the domestic uses. The deposit of copper accompanying with manganese is distributed in Feinan and Petra regions and further the oilshale deposit is found in El-Lajjun of the Karak District and in other two regions. The oilshale reserves in the El-Lajjun region are estimated at about 1,200 million tons. All of these minerals do not reach the stage of production yet from the viewpoint of commercial basis.

## 4.2 Manufacturing Industry

In Jordan, the major industries such as cement, fertilizer, oil refinery and glass are operated as the Government enterprise, and the light industrial products of textiles, leathers, etc. are produced by the private enterprises. A large portion of industries is located in the Greater Amman area, especially in Amman-Ruseifah-Zarqa area. Aqaba which follows Zarqa and Amman in terms of the industrial area is an exclusive port of Jordan and has some large-scale industries.

Cement is among the most important products for export. The production reached about 2,000 thousand tons in each year of 1984 and 1985 increasing every year (see Table A-8). As of 1986, there are two cement plants in Jordan; one is located in Fuheis (the north of Amman) and the other lies Rashadiya in the Tafiela Governorate. In 1984, each factory produced 1,600 thousand tons and 400 thousand tons of cement, and number of employees was 1,200 and 700 respectively.

Phosphate produced at Hasa and Abiad is sent to Aqaba by trucks and trains for the purposes of export and production of fertilizers. Jordan Chemical Fertilizers Co. was established in 1982 in Aqaba and commenced the production of fertilizers such as di-aminonium phosphate (DAP), phosphoric acid and sulphuric acid. The amount of production of DAP increased from 116 thousand tons in 1982 to 510 thousand tons in 1985, and the production of chemical acids such as phosphate acid and sulphuric acid also increased from 632 thousand tons in 1983 to 1,007 thousand tons in 1985. Among them, most chemical acids were consumed in the country and on the other hand more than 90% of DAP produced was exported. Exports of chemical fertilizers of the above three kinds amounted to JD 31 million in total in 1985 (see Tables A-8 & A-12).

Jordan is scarce of petroleum resource as well as water. The refinery has therefore been made using crude oil carried from Saudi Arabia and Iraq, and it has been operated at Zarqa by Jordan Refinery Co. The production of refined petroleum increased from 1,760 thousand

tons in 1980 to 2,420 thousand tons in 1985 at an average growth rate of 6.6% per annum (see Table A-8). Despite such a relatively high growth, the above amount of the production in 1985 was only about 67% of the design capacity. However, in view of increase in petroleum demand in the future, the Company has construction plan of an oil refinery in the Aqaba area which is a centre of transportation and industry in the southern part of Jordan. The plan is designed so as to start the production in 1995.

For the purpose of encouraging the development of light and medium industries, the Government is executing the construction of industrial estates in such regions as Amman, Salt, Irbid and Aqaba, as mentioned in Paragraph 1.2.1.



## 5. INCOME

As mentioned in Paragraph 1.1.2, the Gross National Income (GNP at market prices) in 1985 amounted to JD 1,581 million and the per capita income was JD 689 in the same year. The average annual growth rate was 9.4% for the former and 5.2% for the latter during the period from 1980 to 1985.

Based on the per capita income on the National level, that on each Governorate level is estimated as follows:

Estimates of Average Income per  
Capita by Governorate in 1985

| Governorate    | Per Capita Income |     |
|----------------|-------------------|-----|
|                | JD                | %   |
| Amman          | 738               | 107 |
| Irbid          | 618               | 90  |
| Balqa          | 651               | 94  |
| Karak          | 758               | 110 |
| Ma'an          | 451               | 65  |
| National Level | 689               | 100 |

Among governorates, Karak and Amman were in the relatively high level of the per capita income, while that on Ma'an was only 65% of the National level.

The above estimates are made using the following data:

- (1) Results of the family income survey by governorate which was carried out by the Department of Statistics as an event to "Family Expenditure Survey 1980",
- (2) Number per household in 1979 shown in Table A-23, and
- (3) Per capita Income at the National level in 1980 and 1985.

## 6. INFRASTRUCTURE

### 6.1 Electric Power

The electrical business in Jordan is mainly operated by Jordan Electricity Authority (JEA) and Jordan Electric Power Company (JEPCO), except some municipalities and industrial companies which have their own power plants. In 1985, JEA had a share of more than 80% in the field of the electric power generation, and JEPCO had a share of nearly 50% in the field of the power distribution system.

The capacity of power stations in Jordan totaled 712 MW in 1985 (see Table A-27) and the overhead transmission lines extended to a length of 1,318 km, comprising 1,284 km of the line with 132 KV, 17 km with 66 KV and 17 km with 230 KV.

The electric power generated in Jordan amounted to 2,495 GWh in 1985 against 1,237 GWh in 1981, at an average growth rate of 19.2% per annum. Of the total production in 1985, JEA produced 2,102 GWh or 84.2%. The remaining 15.8% consisted of 0.8% by Irbid District Electricity Co. (IDECO) and other municipalities and 15.0% by industrial companies such as phosphate, cement, petroleum refinery, potash and fertilizer (see Table A-28).

Among the entire electric energy production in 1985, the thermal power amounted to 2,236 GWh (or about 90% share) consisting of 1,916 GWh at HTPS (Hussein Thermal Power Station) located in Zarqa and 320 GWh at the said industrial companies. The remaining 259 GWh was composed of the diesel power of 255 GWh and the gas turbine power of 4 GWh (see Table A-29).

The electrical energy consumption in Jordan rose from 1,028 GWh in 1981 to 2,151 GWh in 1985 at the average increase rate of 20.3% per annum (see Table A-30). Especially, the consumption of industrial sector which showed the high growth rate of 26.8% per annum reached 903 GWh in

1985. The domestic sector consumption in 1985, 655 GWh, was supplied for 401 thousand consumers corresponding to about 2.5 million population or 93% of the total population. The Greater Amman area which has been supplied the electricity by JEPCO had about 250 thousand consumers (63% share) in 1985.

According to the demand forecast of electrical energy by JEA, it is expected that in the year 2,000 the demand will reach about 7,000 GWh per annum which corresponds to three times of that in 1985, of which the demand of industrial and commercial sectors is estimated to be about five times.

## 6.2 Transportation

### 6.2.1 Road

Transportation in Jordan depends mainly on the road traffic. In 1985, Jordan had the primary roads of 2,500 km, the secondary roads of 1,000 km and the rural roads of 2,500 km. The total length of these roads, 6,000 km, consisted of paved roads of 5,400 km (or 90%) and the unpaved roads of 600 km (or 10%). Besides the above roads, there were the agricultural roads unpaved of about 2,000 km. Among them, the primary and secondary roads were increased at the annual rate of about 3% in length during the period from 1977 to 1985 (see Table A-31).

Of the primary roads, the routes No.15 and No.30 are the trunk roads running through the Study Area. The former runs from the Syrian Border on the north to the Saudi Arabia Border on the south including the Desert Highway as a part of this route, and has the total length of 432 km. The latter runs from east to west through Mafraq, Zarqa, Amman and Na'oor extending to the length of 385 km from the Iraq Border to the Jordan River. Besides the above two trunk roads, the Kings Highway, an important trunk road in the Study Area, runs through Madaba, Karak and Tafiela from Na'oor to near Ma'an in parallel with Route No.15. In addition, the primary roads such as Routes Nos. 11, 24, 25, 26, 27 and 29 and many secondary roads form an important transportation network in the Greater Amman area.

The number of vehicles registered in Jordan rose from 135 thousand vehicles in 1980 to 235 thousand vehicles in 1985 at an average annual rate of 11.8%. In 1985, the passenger cars numbered about 145 thousand or accounted for 60% of the total number of vehicles (see Table A-32). At present, more than 85% of vehicles in Jordan are registered in the Amman and Zarqa cities.

The traffic volume on each roads was remarkably increased in proportion to the number of registered vehicles in recent years. For example, the average daily traffic volume on Route No.15 between Amman and Suweileh reached about 13,600 vehicles in 1985 increasing by 18% against 11,200 vehicles in 1982, and also on Route No.30 between Amman and Zarqa it amounted to 10,300 vehicles in 1985 increasing by 31% against 7,100 vehicles in 1982.

To accommodate such growing traffic and to develop the areas concerned, the Government envisages, during the period of Third Five Year Plan, to construct and widen 1,400 km of roads consisting of 400 km of primary roads, 300 km of secondary roads and 700 km of rural roads. Among them, the following projects in the Greater Amman area are expected to be completed or started in the Plan period:

(1) Zarqa By-Pass Road Project

This project aims at constructing the Zarqa By-Pass of 12 km length with 4-lane to alleviate the traffic congestion inside the Zarqa city. It is expected to be completed by the end of 1987.

(2) Zarqa-Sukhneh-Jarash Road Project

This project aims at constructing the primary road connecting Zarqa directly with Jarash. The road is 35 km long and runs along the Zarqa river. It is intended to develop the area socially and economically, and is expected to be completed by the end of 1987.

(3) Construction Project of Service Roads and Interchange on the Queen Alia International Airport Highway

This project aims at constructing the service roads on both sides of the highway and the grade-separated intersections on the highway to ensure the public safety and the access controlled character of the highway. It is expected to be completed by the end of 1990.

(4) Amman-Na'oor-Dead Sea Road Project

This project aims at improving the existing road, upgrading it to four lanes and constructing new sections, especially in the Na'oor slide area. The total length of the road is 35 km. The total cost of the project is estimated at JD 22 million of which JD 16 million will be disbursed during the Plan period (1986-1990).

(5) Amman Outer Ring-Road Project

This project aims at constructing a part of the Amman outer ring-road between Jiza and Sahab/Muwaqqar road extending to the Zarqa By-Pass. The projected road is 40 km long and will improve the flow of traffic and move the transit traffic away from congested areas. It is expected to be started in 1989.

## 6.2.2 Railway

Railway of Jordan was constructed for the first time in 1908 extending from Damascus of Syria to Medina of Saudi Arabia by the Hejaz Jordan Railway (HJR). However, this railway operates at present only range from Amman to Damascus due to the damage of facilities and the business depression. The business has mainly been done for passengers, but during recent few years the number of passengers carried was not more than 60 thousand per annum (see Table A-33).

On the other hand, in 1975 a railway was opened between Aqaba and Hasa by the Aqaba Railway Corporation (ARC) to transport the phosphate rock produced at the Hasa mines, and in 1981 the line was further extended to Abiad. Quantities of phosphates transported by the railway from Hasa and Abiad increased from 1.6 million tons in 1981 to 2.6 million tons in 1985 (see Table A-33).

These Railways are operated by the single track with a narrow gauge of 1,055 mm. HJR with the superannuated facilities has transported a few passengers and cargoes, or less than 1% of the total quantities of

transport in Jordan. Such unfavorable situation of HJR may continue for the time being, unless the equipment and facilities are improved and strengthened adequately. On the other hand, ARC's facilities are expected to be further strengthened in proportion to increase in the phosphate production.

### 6.2.3 Port

Jordan has only a port, Aqaba, located in 300 km south of Amman. Aqaba has prospered as an important station of transport in Arab countries. In 1952, the Aqaba Port Authority (APA) was established expecting that the Aqaba port would develop as a modernized port. In 1954, APA changed the name to the Aqaba Port Department (APD).

According to the statistical data on the trade, the share of the Aqaba port to external trade of Jordan accounted for about 40% in amount. In 1985, exports and imports in the Aqaba port amounted to JD 133 million (43% share) and JD 453 million (42% share), respectively. Quantity of goods loaded in the Aqaba port reached 8.2 million tons in 1985, corresponding to 2.3 times of 3.5 million tons in 1981, and on the other hand the quantity of goods unloaded was 6.4 million in 1985, or 1.1 times of 5.8 million tons in 1981 (see Table A-34). Such a greater increase in quantity of goods loaded was mainly due to increases in quantities of phosphates and potash in 1984 and 1985. Of goods exported through the Aqaba port, phosphates accounted for about 60% of the total quantity in 1985, and potash of 10% and fertilizers of 6% followed phosphates. As for the imported goods, about 70% of the total quantity in the same year was accounted for by general goods (28%), cereals (26%) and steel-iron (16%).

Aqaba port is the important station not only for the external trade of Jordan but also for the transit of cargoes transported from and to Arab countries, especially Iraq. The transit cargoes handled in 1985 amounted to about 4 million tons corresponding to about 30% of the total quantity of cargoes handled, and more than 95% of them were cargoes for



Iraq. Number of vessels which entered the Aqaba port increased from 1,744 in 1981 to 2,671 in 1985 at an average increase rate of 11.2% per annum (see Table A-34).

In response to increase in the handling cargoes and the entering vessels, authorities concerned implemented the following projects during the Second Plan period (1981-1985): extension of berth for handling containers (580 m long), construction of industrial berth to handle potash and fertilizers, rehabilitation and increase of ship-loader capacity at phosphate berth, construction of parking areas with 200 thousand sq. m, and purchase of tugboats and other various equipment and materials. Following the Second Plan, the Present Third Plan is designed to complete the port facilities to meet increase in cargoes handled in the future. To complete these projects about JD 13 million will be disbursed during the Plan period 1986-1990.

#### 6.2.4 Airport

Jordan has at present two airports for general passenger and freight uses; the Queen Alia International Airport and the Aqaba Airport. The former located in 29 km south of Amman succeeded the transportation business from the Amman International Airport on May 1983. The latter is exclusively used for the inland transportation purpose. Both airports are controlled by the Civil Aviation Authority.

The Queen Alia International Airport was designed to accommodate three million passengers a year, with possibilities for expansion to eight million passengers by the year 2,000. On the other hand, the air transport services of Jordan are done by the Royal Jordanian Airlines (Alia). For the period 1980-1985, the following passengers and freight were carried by Alia:

| Category                | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  |
|-------------------------|-------|-------|-------|-------|-------|-------|
| Passengers (thousand)   | 1,112 | 1,443 | 1,666 | 1,582 | 1,347 | 1,290 |
| Freight (thousand tons) | 29    | 37    | 39    | 40    | 38    | 43    |

Source: Statistical Yearbook 1985, Department of Statistics

Number of passengers carried increased from 1,112 thousand in 1980 to 1,290 thousand in 1985 and the freight rose from 29 thousand tons in 1980 to 43 thousand tons in 1985. The average annual growth rate was 3.0% and 8.2%, respectively, during the period 1980-1985. Number of flights which were used for the purpose of passengers and freight transport reached about 16,300 in 1985 increasing by 16% against 14,000 in 1980. Among them, Alia accounted for about 60%.

Currently, Alia holds 32 aircrafts, consisting of 4 Boeing 747's, 16 Lockheed Tristars, 9 Boeing 727's and 3 Boeing 707's, and it connects with more than 30 cities in the world.

### 6.3 Telecommunications

All telecommunications in Jordan are operated by Telecommunications Corporation of Jordan (TCC) which has major two installations; National Switching Center serving domestic needs and International Switching Center which provides links with foreign countries. The former currently provides direct dial services between Amman and a network of 48 localities (cities, towns and villages) in Jordan, and the latter provides 534 international circuits to 57 countries via the satellite earth station system. The Jordan Arabsat Earth Station is among the first stations installed in the Arab World. This station provides additional links with Arabsat members countries. Circuits have been established with Bahrain, Saudi Arabia, Oman, Algeria and Kuwait.

Number of telephone subscribers in Jordan increased from 73 thousand in 1981 to 145 thousand in 1985 at the average rate of 18.6% per annum. In 1985, the Greater Amman area had 114 thousand subscribers corresponding to nearly 80% of the total subscribers in Jordan (see Table A-35).

An average number of telephones per 100 inhabitants which shows a penetration ratio of telephone can be calculated using the above number of subscribers. It reached 5.5 units in Jordan and 7.2 units in the Amman Governorate in 1985 rising at an average annual rate of about 15% and 17%, respectively, during the period 1981-1985 (see Table A-36). According to the Third Plan, by the end of the year 1990 it is expected to rise to 16.3 units in Jordan and 19.2 units in the Amman Governorate. This figure means on the other hand that the percentage of telephone number per household will reach nearly 100% in Jordan and 115% in the Amman Governorate. To achieve these figures, the Third Plan envisages to provide an additional 220 thousand telephones.

## 7. MUNICIPAL WATER DEMAND

### 7.1 Basic Concept

The water demand for municipal purpose is estimated for all cities, towns and villages in the Study Area; the Greater Amman area and the Mujib basin. In the present study, the commercial and small-scale industrial water as well as the domestic water are included in the municipal water, but water for large-scale industries is excluded from the municipal water for reason that almost all of them have their own well water supplies. Besides, other non-domestic water used for institutions such as hospital, hotel, school and office is also regarded as the municipal water.

The estimate of water demand in the present study is based on a review of the following references related to the water supply and demand in Jordan:

- [1] NATIONAL WATER MASTER PLAN OF JORDAN, Vol. I, V, VI and VII, 1977, Natural Resources Authority.
- [2] NORTH JORDAN WATER USE STRATEGY, 1978, Vol. 3, Howard Humphreys and Sons.
- [3] WATER SUPPLY PROJECT FROM THE RIVER EUPHRATES, Vol. 1, 1983, National Planning Council.
- [4] STUDY OF THE PRIMARY AND SECONDARY CONVEYANCE SYSTEMS FOR DOMESTIC WATER SUPPLY IN THE AMMAN, BALQA AND IRBID GOVERNORATES, Vol. 1, 1984, National Planning Council.
- [5] WATER SECTOR STUDY, 1984, World Bank.
- [6] FEASIBILITY STUDY FOR AMMAN WATER SUPPLY AND SEWERAGE FACILITIES, 1977, VBB.

The most suitable estimate would be obtained from a comparative study among the respective estimates in the above references.

To estimate the municipal water demand in the future, the following factors are studied:

- (1) Future population,
- (2) Per capita water demand for domestic use,
- (3) Water demand for non-domestic use, and
- (4) Water losses in distribution system.

Using the projected results of the above factors, the projection of the municipal water demand is made in the following process: First, the domestic water demand is estimated using the projections of population and per capita water demand, and then the municipal water demand is obtained by adding the above non-domestic water demand and water losses to the domestic water. The projection of water demand are made every five years during the period from 1985 to the target year of 2005.

## 7.2 Population Projection

### 7.2.1 General Description

In recent years, a detailed population projection in Jordan was made in the study of National Water Master Plan (NWMP) 1977 [1]. In 1983, National Planning Council (NPC) forecasted the future population by 2005 through the study of "Water Supply Project from the River Euphrates [3]" quoting the result of "Jordan Urban Sector Review, IBRD, 1982". World Bank also projected the future population of Jordan by small locality through the Water Sector Study (WSS) 1984 [5]. In addition to the said projections, Ministry of Planning (MOP) at present has figures of population projected based on the results of National Village Survey 1984. These projected population together with the 1985 population estimated by the Department of Statistics (DOS) are summarized as follows:

Population Projections of Jordan

| Sources | Census    | Projection (10 <sup>3</sup> persons) |       |       |       |
|---------|-----------|--------------------------------------|-------|-------|-------|
|         | 1979      | 1985                                 | 1990  | 2000  | 2005  |
| NWMP[1] | -         | 2,743                                | -     | 4,445 | -     |
| NPC[3]  | 2,147,594 | -                                    | 3,175 | -     | 4,949 |
| WSS[5]  | 2,147,594 | 2,674                                | 3,197 | 4,351 | -     |
| MOP     | 2,168,400 | 2,671                                | 3,157 | -     | -     |
| DOS     | 2,132,997 | 2,694                                | -     | -     | -     |

The population projection in NWMP was made in detail assuming a reasonable growth rate of population by the smallest unit of villages based on the 1961 Population Census and the 1975 Agricultural Census. As a result, the future population of Jordan was estimated to be 2,740 thousand in 1985 and 4,445 thousand in 2000. Although the NWMP's study

is among the most close projection, it seems to be unavailable for our study for the reason that the 1961 Population Census was adopted as a basic population.

After the NWMP's study, the Second Population Census was conducted in 1979. The population projection in the Water Sector Study (WSS) by World Bank was carried out by locality group taking into account the population growth rate for the period from 1961 to 1979 and based on the preliminary results of the 1979 Census. After that, the population in the 1979 Census was changed from 2,147,594 in the preliminary results to 2,132,997 in the final results. The WSS population projection under a rational assumption of the population growth rate seems to be a reliable one, though a minor change should be taken for the population number in 1979.

The said MOP's population projection was carried out till the year 1990 by village unit based on the latest information on the population growth. The 1979 population number used for this projection was 2,168,400 increasing by about 35,000 than the 1979 Census result of 2,132,997 by the Department of Statistics. The increased population in 1979 is said to be an additional population in the areas which are left out of the 1979 Census.

Although there is a little difference among the above population number in the 1979 base year, it will not produce a serious effect on the projection. For example, as seen in the above table, the 1985 population projected by the respective authorities ranges from 2,670 thousand to 2,740 thousand which the difference between the upper and lower is less than 3% of the projected population. On the other hand, the population growth rates adopted in the said respective projections were assumed under the close study in all cases, and all of them seem to be available for our study.

Taking into consideration such a situation on the population projection, the following conditions are assumed for a convenience of our study:

- (1) To apply the final result of the 1979 Census as a population in the base year, and
- (2) To apply the population growth rate by locality group classified by the size of population in the 1979 Census.

The final result of the 1979 Population Census by locality group is given in Table A-22, and the growth rate to be applied to population projection is quoted from the result of Water Sector Study (WSS) by World Bank, which is said to be among "the best estimates".

#### 7.2.2 Population Growth Rate

Table A-37 shows an average annual rate of population growth to be applied to the population projection. For example, the average growth rate of the whole country is assumed to be 3.7% for the period from 1979 to 1985, 3.6% between 1985 to 1990, and falling to 3.1% thereafter. A fairly high growth rate is applied to the population in cities such as Amman, Zarqa, Irbid and Ruseifa.

#### 7.2.3 Population Projection

The future population in the Study Area is estimated for each town and village by stage till the year 2005, using the final result of the 1979 Census (Table A-22) and the population growth rate shown in Table A-37. As a result, the population in the Study Area is estimated to be nearly 1,700 thousand in 1985 and 3,500 thousand in 2005. On the other hand, it is expected that Jordan will have population of about 2,700 thousand in 1985 and 5,000 thousand in 2005. According to this projection, the share of population in the Study Area to the national population will rise from 62% in 1979 to 63% in 1985, and further to 70% in 2005 (Table A-38).



## 7.3 Municipal Water Demand

### 7.3.1 Per Capita Domestic Water Demand

In general, the per capita domestic water demand (PCDWD) has a tendency to increase due to growth in consumers' incomes and improvement of living standards of inhabitants. Taking into account such increase in water demand, the PCDWD was estimated in the respective studies listed in Section 7.1. The results are summarized in Table A-39. The estimates were made by the year 2000 or 2005 by the locality group classified in accordance with the size of population. The classification of locality is conformed to that which is applied to the projection of population growth rate, after making the adjustment of some discrepancy among the said studies. As seen in Table A-39, the PCDWD forecasted in Reference [1] is somewhat high and that of Reference [5] is low comparatively. Distribution of the forecasted PCDWD has a fairly spread and its number is a few. Therefore, it is considered to be difficult to estimate statistically a probable value of PCDWD from these data. So, in the present study, a simple graphical estimation is carried out and the result is summarized in Table A-40.

Each figure in the table gives a middle value approximately with a deviation less than plus and minus 20% from the middle value. The PCDWD in the Amman city having the highest value is estimated at 95 l/c/d in 1985 and 115 l/c/d in 2005, and for the smallest community group it is estimated at 45 l/c/d in 1985 and 65 l/c/d in 2005. The domestic water demand (except non-domestic water demand and water losses in the distribution system) can be estimated from the PCDWD and population by locality group, and in the Study Area it will amount to about 50 MCM in 1985 and 130 MCM in 2005.

### 7.3.2 Non-Domestic Water Demand

The non-domestic sector consists of commercial and small-scale industrial sectors and other institutional sectors as mentioned in Section 7.1. The non-domestic water demand (NDWD) was forecasted in four studies ([1], [2], [3] and [4]) as shown in Table A-41. In these studies, the NDWD was shown in litre/capita/day (l/c/d) and/or in percent/capita/day (p/c/d). In the present study, p/c/d is applied to the expression of NDWD as a matter of convenience. Where the percent expresses a ratio of the non-domestic water demand to the domestic water demand.

As seen in the table, the NDWD's projections in these studies have the feature respectively as follows:

- (1) As for [1] and [4], the NDWD was projected to be a constant value for each locality during the period 1975-2000 and 1982-2005, respectively. It means that the NDWD is the same increase rate as that of the domestic water demand.
- (2) The NDWD shown in [2] were the highest among estimates of four kinds. For example, a ratio of the per capita NDWD to the PCDWD in the Amman city was estimated at 40% in 1985 and 43% in 2000.
- (3) In [3], the NDWD was forecasted to have the large increase yearly in the urban area and to be the same increase rate as that of the domestic water demand.

In general, it is considered that an annual increase rate of water demand for non-domestic uses such as commercial and small-scale industrial uses will be larger than that of domestic water demand, and the NDWD will be increased in proportion to the rise in GNP. However, it is difficult to obtain a significant result by detailed analysis using data given in Table A-41, hence a simple average of four projections is

adopted for the present study. The calculation is made in the following process:

First, during the period 1975-2000, the NDWDs in years which have not the projected figures in the table are estimated by the interpolation or extrapolation using figures in years which the projections of NDWD are being given, and next the average of four estimates is calculated by locality group in respective years. The results are rounded by the unit of 5% taking into account the accuracy of result obtained after the calculation of average as shown in Table A-42. The table indicates that for example the non-domestic water demand in the Amman city in 2005 will be 25% of the domestic water demand, 20% in the Zarqa and Irbid cities, 15% in each city and town with population of 3,000 and more, and 10% in each community with below 3,000 population.

### 7.3.3 Water Losses in Distribution Systems

Water losses in the distribution systems were studied in [1], [2] and [3] listed in Section 7.1, and these studies were based on the Feasibility Study for Amman Water Supply and Sewerage Facilities, 1977, VBB, Fawzi & Associates (VBB Report). The VBB Report had the following conclusion on the lost and unaccounted water in the distribution system based on actual field survey and detailed study in 1975:

| <u>Items</u>                             | <u>Rate (%)</u> |
|--|-----------------|
| (1) Unknown or illegal connections       | 0-1             |
| (2) Leakages                             | 12-15           |
| (3) Overflowing at reservoirs            | 0-1             |
| (4) Overestimated production             | 5-10            |
| (5) Underregistration in consumer meters | 20-30           |
| (6) Unmeasured deliveries outside Amman  | 0-1             |
|  | -----           |
| Total                                    | 37-58           |

The above table indicates that the total quantity of unaccounted water ranged between 37% and 58% of the produced water in 1975. Such a quantity, for example, would have to be considered as the decrease in income which accrues from the sale of water. Based on the result of study in 1975, the VBB forecasted that the unaccounted quantity would decline from 37% in 1985 to 30% in and after 2000 due to improvement of materials and effort to detect leakage and illegal connections in the water distribution systems. In the present study, this percentage forecasted in the VBB report will be considered as a decrease in benefit which accrues from implementation of the pipeline projects described in Chapters F4 and F5, Main Report.

Nevertheless there was such a great quantity unaccounted in the water distribution systems, the real losses were little quantity which ranged from 12% to 16% consisting of the leakages (12% to 15%) and the overflowing at reservoirs (0% to 1%). On the other hand, the real water losses estimated in the said references [1], [2] and [3] were 20% on average during the period from 1985 to 2005 as shown in Table A-43. Where this average percentage indicates a ratio to the sum of domestic

and non-domestic water demand, namely, it corresponds to 17% of the total water demand (including the losses). This percentage is close to the real losses indicated in the VBB Report.

In 1982, a questionnaire in terms of the water leakage rate was conducted on 67 cities (25 countries) in the world by the Japan Water Works Association, and the result is shown below:

| Leakage Rate<br>(%) | Distribution<br>(%) |
|---------------------|---------------------|
| -----               | -----               |
| 0-5                 | 10.5                |
| 5-10                | 19.4                |
| 10-15               | 19.4                |
| 15-20               | 11.9                |
| 20-25               | 9.0                 |
| Over 25             | 16.4                |
| Unknown             | 13.4                |

From the above distribution of leakage rate, the central value is estimated at nearly 15%.

As indicated above, the real loss rate ranges between 12% and 17% of produced water. Taking into account the unfavorable condition of long distance transport from the Mujib basin, the real water losses in the estimated water demand are assumed, in the present study, to be 17% of the total quantity of water to be supplied, or 20% of the sum of domestic and non-domestic water demand. This loss rate will be applied to estimate of the future municipal water demand in the Study Area.

#### 7.3.4 Per Capita Municipal Water Demand

The water demand per capita for municipal use, consisting of domestic and non-domestic uses and water losses in the distribution systems, is given in Table A-44. The result indicates that the municipal water demand per capita in the Amman city will be 137 l/c/d in 1985 and 172 l/c/d in 2005, and in the small localities with population less than 3,000, it will be 59 l/c/d in 1985 and 86 l/c/d in 2005.

#### 7.3.5 Projections of Municipal Water Demand

Municipal water demand in the future is estimated by town and village in the Study Area, using both estimates of the future population and the municipal water demand per capita. The results are summarized in Table A-45 and Fig. A-1. In this case, the served ratio is assumed to be 100%. It is expected that the water demand in the Study Area in 1985 amounts to 70 MCM per year, which are composed of 68 MCM per year for the Greater Amman area and 2 MCM per year for the Wadi Mujib basin. In the target year of 2005, the Study Area will demand water of 192 MCM per year for the municipal purposes including 188 MCM per year for the Greater Amman area and 4 MCM per year for the Wadi Mujib basin. The share of municipal water demand in the Study Area to that in the entire country will increase from 71% in 1985 to 75% in 2005.

According to the statistical data of WAJ in terms of the water supply, in 1985 water of 61.5 MCM was supplied as a municipal water to the Amman and Zarqa Governorates. On the other hand, the water demand for municipal purpose is estimated at 64 MCM in the same year in the said both Governorates as shown in Table A-45, namely, this estimate is close to the said actual supply. It suggests that estimates of water demand in the present study will give the reliable figures relatively.

#### 7.4 Water Balance in the Greater Amman Area

Fig. A-1 shows a relation between demand and supply for the municipal water in the Greater Amman area. Where the municipal water excludes water for the large-scale industries which have their own well water supplies.

The municipal water demand in the Greater Amman area is estimated at about 68 MCM per annum in 1985. It consists of 64 MCM per annum for Amman Governorate (including Zarqa Governorate under the new administrative units) and 4 MCM per annum for a part of Balqa Governorate (see Table A-45).

On the other hand, the municipal water in Amman and Zarqa Governorates since 1983 has been supplied from four water sources; Amman bore holes, Zarqa bore holes, Azraq well fields and Qastal well fields. These sustained yields are estimated at about 50 MCM per annum in total. (Detailed breakdown is given in Appendix G.)

In 1985, the water balance in Amman and Zarqa Governorates was apparently a deficit of supply by about 14 MCM per annum. However, actual water supply volume in the same year recorded about 61.5 MCM in total, including the emergency water supply of about 1.5 MCM from the East Ghor Main Canal. It appears that a difference between actual and sustained yields is due to over extraction at the said four sources, and the actual water supply volume (61.5 MCM) which includes the over extraction volume met nearly the estimated water demand mentioned in Paragraph 7.3.5.

To relieve such water shortage in the Greater Amman area, the Wala and Mukheiba conveyance projects are at present planned to be completed in 1987 for the former with the water supply volume of 15 MCM per annum, and in 1990 for the latter with 26 MCM per annum. By completing these two projects, an available water for the municipal purpose in the Greater Amman area will amount to more than 90 MCM per annum in 1990, which will meet the municipal water demand of 90 MCM forecasted in the same year.

Further, to meet the municipal water demand expected in the same area after 1990, the supply from Siwaqa-Qatrana-Sultani and Rumeil well fields will be expected based on a potential studies of ground and surface water in the Mujib basin. The sustained yields in these well fields are estimated at about 23 MCM per annum in total, consisting of 16 MCM from the Siwaqa-Qatrana-Sultani well fields and 7 MCM from the Rumeil well fields.

Assuming that all of the said projects will be realized, in 1995 the available water to be supplied to the Greater Amman area will reach about 114 MCM per annum which is close to the municipal water demand of about 120 MCM expected in the same year. As a result, water supplied from well fields in the Mujib basin to the Greater Amman area will increase from 11 MCM (22% share) in 1985 to 49 MCM (43% share) in 1995, nevertheless the unfavorable balance of water in the Greater Amman area appears to continue still after 1995, so far as the new water sources are not developed. The counterplan should be considered as promptly as possible.



## 7.5 Other Water Demand

The present section describes outline of the large-scale industrial water demand which is excluded from discussion of the municipal water demand for reason that almost all the large-scale industries have their own well water supplies.

In the Study Area, major industries such as oil refinery, 7-Up Company and cement factory together with military camps are mainly located in the Zarqa-Ruseifa area, except a mining industry, the Abiad Phosphate Mine, where lies southern end of Mujib basin.

The water demand for large-scale industrial uses was estimated in previous reports [1], [2], [3] and [4] shown in Section 7.1, and as a result of review of these reports the following matters have been identified:

- (1) The quantity of water demand for major industrial uses by the year 2000 was first estimated in reference [1](1977) and after that its result was revised in reference [2](1978).
- (2) In reference [3](1983), an estimate of major industrial water demand by the year 2005 was made taking into consideration the results of the above two reports and using the latest information in 1983, and its result was agreed by reference [4](1984). Accordingly, the estimate of water demand for major industrial uses shown in reference [4] is consistent with that in reference [3].

These results are summarized below:

Estimates of Large-Scale Industrial Water Demand  
in the Greater Amman Area

Unit: MCM

| Reference | 1985 | 1990 | 1995 | 2000 | 2005           |
|-----------|------|------|------|------|----------------|
| [1]&[2]   | 13.6 | 17.0 | 20.5 | 23.9 | 27.4/ <u>1</u> |
| [3]&[4]   | 12.4 | 16.4 | 21.0 | 24.9 | 27.8           |
| Average   | 13.0 | 16.7 | 20.7 | 24.4 | 27.6           |

1: estimated in the present study by the extrapolation using data by the year 2000.

The above table indicates that the water demand for large-scale industrial uses would rise from 13 MCM in 1985 to 27 MCM (twice as much) in 2005. Of these water demand, the large water demand for oil refinery, 7-Up Company, cement factory and military camp uses is estimated at 2.4 MCM, 4.0 MCM, 0.6 MCM and 1.3 MCM in 2005, respectively. On the other hand, the water demand for Abiad phosphate mining operation is estimated at about 3.5 MCM per annum during the period from 1985 to 1992 (closing year) according to information from the Jordan Phosphate Mines Company.

Besides the said industries, there are some large-scale industries such as phosphate mine and potash and cement factories around the Study Area. In 1985, the water consumption of these industries was about 7 MCM for the Hasa Phosphate Mine which lies outside the Mujib basin boundary at 30 km south of the Abiad Mine, 7 MCM for the potash factory located in the southern part of the Dead Seacoast and 0.6 MCM for the cement factory in the Tafielah Governorate. Among them, water required for potash refinery is expected to rise fairly in the future because the company envisages increasing the production of potash.

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Table A-1 GROSS DOMESTIC PRODUCT (GDP)  
BY INDUSTRIAL ORIGIN

Unit : Million JD

| Industrial Origin                                     | 1980    | 1981    | 1982    | 1983*   | 1984*   | 1985**  |
|---|---------|---------|---------|---------|---------|---------|
| 1. Agriculture, forestry and fishing                  | 64.6    | 76.6    | 83.8    | 110.0   | 95.8    | 112.1   |
| 2. Mining & quarrying industries                      | 39.9    | 43.2    | 45.4    | 38.0    | 56.8    | 56.8    |
| 3. Manufacturing industry                             | 127.2   | 165.1   | 184.9   | 161.1   | 166.4   | 166.4   |
| 4. Electric power & water supplies                    | 17.1    | 21.0    | 25.3    | 28.3    | 32.4    | 34.8    |
| 5. Construction                                       | 97.5    | 110.6   | 121.9   | 126.8   | 127.0   | 124.4   |
| 6. Wholesale & retail trade, restaurants and hotels   | 166.5   | 196.7   | 210.9   | 228.0   | 241.5   | 256.0   |
| 7. Transport & communication                          | 79.7    | 102.7   | 123.5   | 136.7   | 143.5   | 152.2   |
| 8. Finance, real estate and business services         | 105.9   | 111.2   | 129.2   | 135.6   | 144.5   | 158.0   |
| 9. Community, social and personal services            | 14.9    | 19.1    | 24.7    | 27.2    | 36.3    | 40.0    |
| 10. Imputed bank service charges                      | 10.5    | 13.0    | 17.2    | 22.2    | 25.0    | 27.3    |
| 11. Producers of government services                  | 170.2   | 191.2   | 218.5   | 232.0   | 238.4   | 256.8   |
| 12. Non-profit institutions                           | 13.9    | 15.8    | 18.2    | 20.2    | 22.1    | 24.3    |
| 13. Household services                                | 1.5     | 2.4     | 2.5     | 3.5     | 4.0     | 4.1     |
| 14. Gross Domestic Product at factor cost             | 888.4   | 1,042.6 | 1,171.6 | 1,225.2 | 1,283.7 | 1,358.6 |
| 15. Indirect taxes                                    | 91.1    | 123.1   | 151.6   | 197.5   | 206.3   | 222.4   |
| 16. GDP at market prices                              | 979.5   | 1,165.7 | 1,323.2 | 1,422.7 | 1,490.0 | 1,581.0 |
| 17. Net factor income from abroad                     | 205.8   | 318.5   | 352.2   | 346.7   | 354.2   | 275.0   |
| 18. GNP at market price                               | 1,185.3 | 1,484.2 | 1,675.4 | 1,769.4 | 1,844.2 | 1,856.0 |
| 19. Per capita GNP at market prices (JD)              | 534.3   | 643.4   | 698.3   | 709.1   | 710.6   | 689.0   |
| 20. Per capita GNP at constant prices (JD) (1980=100) | 534.3   | 597.4   | 603.5   | 583.6   | 563.1   | 530.0   |

\* Preliminary

\*\* Estimates

Sources : Annual Reports 1984 & 1985, Central Bank of Jordan

Table A-2 GROWTH RATES OF GDP AND GNP

Unit : %

| Item                               | 1981 | 1982 | 1983 | 1984 | 1985 | Annual<br>Average<br>1981-<br>1985 |
|------------------------------------|------|------|------|------|------|------------------------------------|
| <b>Current Prices</b>              |      |      |      |      |      |                                    |
| GDP at factor cost                 | 17.4 | 12.4 | 4.6  | 4.8  | 5.8  | 9.0                                |
| GDP at market prices               | 19.0 | 13.5 | 7.5  | 4.7  | 6.1  | 10.0                               |
| GNP at market prices               | 25.2 | 12.9 | 5.6  | 4.2  | 0.6  | 9.4                                |
| Per capita GNP at<br>market prices | 20.4 | 8.5  | 1.5  | 0.2  | -3.0 | 5.2                                |
| <b>Constant prices (1980=100)</b>  |      |      |      |      |      |                                    |
| GDP at factor cost                 | 9.0  | 4.6  | -0.4 | 0.9  | 2.7  | 3.3                                |
| GDP at market prices               | 10.5 | 5.7  | 2.4  | 0.8  | 3.0  | 4.4                                |
| GNP at market prices               | 16.3 | 5.1  | 0.6  | 0.3  | -2.3 | 3.3                                |
| Per capita GNP at<br>market prices | 11.8 | 1.0  | -3.3 | -3.5 | -5.9 | -0.2                               |

Source : Annual Reports 1984 &amp; 1985, Central Bank of Jordan.

Table A-3 CONTRIBUTION OF EACH ECONOMIC SECTOR TO GDP  
(at Factor Cost)

Unit : %

| Industrial Origin                             | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  |
|---|-------|-------|-------|-------|-------|-------|
| Agriculture                                   | 7.3   | 7.3   | 7.2   | 9.0   | 7.4   | 8.3   |
| Mining & manufacturing<br>industries          | 18.8  | 20.0  | 19.7  | 16.3  | 17.4  | 16.4  |
| Electric power & water<br>supplies            | 1.9   | 2.0   | 2.2   | 2.3   | 2.5   | 2.6   |
| Construction                                  | 11.0  | 10.6  | 10.4  | 10.3  | 9.9   | 9.2   |
| Total of productive sectors                   | 39.0  | 39.9  | 39.5  | 37.9  | 37.2  | 36.5  |
| Trade   | 18.7  | 18.9  | 18.0  | 18.6  | 18.8  | 18.8  |
| Transport & communications                    | 9.0   | 9.9   | 10.5  | 11.2  | 11.2  | 11.2  |
| Finance, real estate and<br>business services | 11.9  | 10.7  | 11.0  | 11.1  | 11.3  | 11.6  |
| Producers of government<br>services           | 19.2  | 18.3  | 18.6  | 18.9  | 18.6  | 18.9  |
| Other services                                | 2.2   | 2.3   | 2.4   | 2.3   | 2.9   | 3.0   |
| Total of service sectors                      | 61.0  | 60.1  | 60.5  | 62.1  | 62.8  | 63.5  |
| Gross domestic product                        | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Source : Annual Reports 1984 &amp; 1985, Central Bank of Jordan.

Table A-4 SECTORAL ECONOMIC GROWTH RATES  
(at Current Prices)

Unit : %

| Industrial Origin                                       | 1981 | 1982 | 1983  | 1984  | 1985 | Annual<br>Average<br>1981-<br>1985 |
|---|------|------|-------|-------|------|------------------------------------|
| 1. Agriculture, forestry<br>and fishing                 | 18.6 | 9.4  | 31.3  | -12.9 | 17.0 | 12.7                               |
| 2. Mining and quarrying<br>industries                   | 8.3  | 5.1  | -16.3 | 49.5  | 0.0  | 9.3                                |
| 3. Manufacturing industry                               | 29.8 | 12.0 | -12.9 | 3.3   | 0.0  | 6.4                                |
| 4. Electric power & water<br>supplies                   | 22.8 | 20.5 | 11.9  | 14.5  | 7.4  | 15.4                               |
| 5. Construction   | 13.4 | 10.2 | 4.0   | 0.2   | -2.0 | 5.2                                |
| 6. Wholesale & retail<br>trade, restaurants<br>& hotels | 18.1 | 7.2  | 8.1   | 5.9   | 6.0  | 9.1                                |
| 7. Transport<br>& communications                        | 28.9 | 20.3 | 10.7  | 5.0   | 6.1  | 14.2                               |
| 8. Finance, real estate<br>& business services          | 5.0  | 16.2 | 5.0   | 6.6   | 9.3  | 8.4                                |
| 9. Community, social &<br>personal services             | 28.2 | 29.3 | 10.1  | 33.5  | 10.2 | 22.3                               |
| 10. Imputed bank service<br>charges                     | 23.8 | 32.3 | 29.1  | 12.6  | 9.2  | 21.4                               |
| 11. Producers of government<br>services                 | 12.3 | 14.3 | 6.2   | 2.8   | 7.7  | 8.7                                |
| 12. Non-profit institutions                             | 13.7 | 15.2 | 11.0  | 9.4   | 10.0 | 11.9                               |
| 13. Household services                                  | 60.0 | 4.2  | 40.0  | 14.3  | 2.5  | 24.2                               |
| Gross domestic product<br>at factor cost                | 17.4 | 12.4 | 4.6   | 4.8   | 5.8  | 9.0                                |

Source : Annual Reports 1984 & 1985, Central Bank of Jordan.

Table A-5 PRODUCTION OF MAIN AGRICULTURAL CROPS

Unit : Thousand Tons

| Products              | 1980  | 1981  | 1982  | 1983  | 1984* | 1985** |
|-----------------------|-------|-------|-------|-------|-------|--------|
| <b>Field Crops</b>    |       |       |       |       |       |        |
| Wheat                 | 133.5 | 50.6  | 52.3  | 130.7 | 49.7  | 62.8   |
| Barley                | 38.1  | 19.2  | 19.7  | 28.2  | 11.9  | 19.3   |
| Tobacco               | 3.3   | 3.4   | 3.4   | 5.8   | 2.5   | 3.5    |
| Lentils               | 6.3   | 7.9   | 8.1   | 8.4   | 2.5   | 4.1    |
| Vetch                 | 1.8   | 2.4   | 2.6   | 3.0   | 2.1   | 2.3    |
| Chick peas            | 1.8   | 2.4   | 1.5   | 2.9   | 0.6   | 1.2    |
| <b>Vegetables</b>     |       |       |       |       |       |        |
| Tomatoes              | 162.9 | 204.5 | 195.3 | 212.3 | 208.7 | 412.2  |
| Cucumbers             | 38.7  | 43.7  | 59.5  | 53.7  | 41.9  | 204.7  |
| Eggplant              | 52.4  | 62.4  | 45.4  | 47.8  | 51.1  | 76.2   |
| Melons                | 40.3  | 46.9  | 45.9  | 48.4  | 24.4  | 116.6  |
| Cauliflower & cabbage | 15.4  | 10.9  | 11.4  | 11.0  | 24.7  | 64.3   |
| Broad beans           | 10.8  | 3.5   | 3.8   | 3.6   | 4.7   | 10.0   |
| <b>Tree Fruits</b>    |       |       |       |       |       |        |
| Olives                | 44.5  | 18.9  | 40.4  | 22.2  | 50.0  | 20.7   |
| Grapes                | 18.2  | 25.8  | 26.8  | 25.8  | 8.6   | 30.7   |
| Citrus fruits         | 49.0  | 52.3  | 68.7  | 50.2  | 48.3  | 51.9   |
| bananas               | 6.2   | 7.3   | 6.7   | 6.9   | 14.3  | 26.2   |
| Figs                  | 1.0   | 1.1   | 1.1   | 1.2   | 0.3   | 0.9    |

\* Preliminary

\*\* Estimates

Source : Annual Reports 1984 &amp; 1985, Central Bank of Jordan.

Table A-6 GROWTH RATES OF PRINCIPAL AGRICULTURAL PRODUCTIONS

Unit : %

| Products              | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  |
|-----------------------|-------|-------|-------|-------|-------|-------|
| Wheat                 | 709.1 | -62.1 | 3.4   | 150.0 | -62.0 | 26.4  |
| Barley                | 693.8 | -49.6 | 2.6   | 43.1  | -57.8 | 65.5  |
| Tobacco               | 200.0 | 3.0   | -     | 70.6  | 56.9  | 40.0  |
| Tomatoes              | -5.2  | 25.5  | -4.5  | 8.7   | -1.7  | 97.5  |
| Cucumbers             | 75.9  | 12.9  | 36.2  | -9.7  | -22.0 | 388.5 |
| Eggplant              | -0.6  | 19.1  | -27.2 | 5.3   | 6.9   | 49.1  |
| Melon                 | 160.0 | 16.4  | -2.1  | 5.4   | -49.6 | 377.9 |
| Cauliflower & cabbage | -6.7  | -29.2 | 4.6   | -3.5  | 124.5 | 160.3 |
| Olives                | 554.4 | -57.5 | 113.8 | -45.0 | 125.2 | -58.6 |
| Grapes                | -20.9 | 41.8  | 3.9   | -3.7  | -66.7 | 257.0 |
| Citrus                | 63.3  | 6.7   | 31.4  | -26.9 | -3.8  | 7.5   |
| Bananas               | -22.5 | 17.7  | -8.2  | 3.0   | 107.2 | 83.2  |

Source : Annual Reports 1984 &amp; 1985, Central Bank of Jordan

Table A-7 INDEX OF INDUSTRIAL PRODUCTION

(1979=100)

| Item                             | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  |
|----------------------------------|-------|-------|-------|-------|-------|-------|
| Food, drinks and fodder          | 103.2 | 115.9 | 111.3 | 102.8 | 116.4 | 101.5 |
| Food, stuffs                     | 106.8 | 111.1 | 130.2 | 117.3 | 136.8 | 142.2 |
| Soft drinks                      | 109.7 | 118.6 | 62.1  | 65.7  | 86.9  | 78.1  |
| Alcoholic drinks                 | 104.4 | 143.2 | 158.3 | 119.4 | 135.6 | 89.6  |
| Fodder                           | 93.0  | 108.0 | 124.7 | 119.1 | 118.9 | 90.3  |
| Cigarettes and matches           | 123.7 | 140.4 | 139.8 | 119.6 | 131.8 | 107.7 |
| Clothes and textiles             | 112.5 | 94.3  | 81.8  | 96.3  | 126.4 | 167.3 |
| Construction materials           | 118.8 | 163.9 | 152.5 | 176.0 | 177.8 | 191.3 |
| Iron                             | 106.9 | 169.0 | 158.3 | 173.2 | 139.1 | 165.5 |
| Cement                           | 146.4 | 154.7 | 126.5 | 203.6 | 325.1 | 324.6 |
| Chemicals                        | 125.5 | 133.7 | 138.7 | 131.8 | 172.8 | 165.2 |
| Pharmaceuticals                  | 173.1 | 172.0 | 209.3 | 223.8 | 291.3 | 341.1 |
| Paints                           | 92.4  | 103.6 | 109.4 | 122.8 | 120.9 | 113.7 |
| Plastic and sponge               | 99.1  | 102.9 | 108.6 | 99.6  | 92.6  | 89.1  |
| Detergents and soaps             | 117.5 | 133.7 | 114.9 | 86.1  | 149.8 | 98.5  |
| Petroleum Products               | 105.7 | 126.9 | 146.0 | 144.2 | 144.9 | 141.1 |
| Phosphates                       | 138.3 | 150.1 | 155.3 | 167.8 | 219.7 | 214.6 |
| Electric power & batteries       | 120.8 | 131.7 | 160.2 | 195.7 | 228.0 | 249.2 |
| Electric power                   | 121.9 | 135.0 | 169.8 | 207.1 | 240.6 | 263.5 |
| Batteries                        | 106.9 | 90.1  | 37.4  | 49.7  | 66.4  | 63.8  |
| Paper and cardboard              | 91.6  | 162.1 | 148.3 | 111.7 | 160.8 | 200.0 |
| Footwear and leather             | 99.9  | 102.6 | 98.4  | 104.7 | 107.0 | 108.7 |
| Overall index                    | 119.5 | 139.2 | 143.8 | 150.9 | 173.0 | 173.6 |
| Comparison with<br>previous year | 119.5 | 116.5 | 103.3 | 104.9 | 114.6 | 100.3 |

Source : Annual Reports 1984 &amp; 1985, Central Bank of Jordan



Table A-8 PRODUCTION OF PRINCIPAL INDUSTRIES

| Products                   | Unit       | 1980     | 1981     | 1982     | 1983     | 1984     | 1985     |
|----------------------------|------------|----------|----------|----------|----------|----------|----------|
| Dry phosphates             | 000 ton    | 3,911.3  | 4,243.7  | 4,390.5  | 4,745.5  | 6,213.1  | 6,067.1  |
| Potash                     | 000 ton    | -        | -        | 150.0    | 282.8    | 486.0    | 908.2    |
| Cement                     | 000 ton    | 912.7    | 964.7    | 788.4    | 1,269.0  | 2,026.3  | 2,022.9  |
| Petroleum products         | 000 ton    | 1,760.0  | 2,126.0  | 2,463.9  | 2,499.0  | 2,510.9  | 2,423.9  |
| Fertilizers                | 000 ton    | -        | -        | 116.4    | 301.6    | 541.0    | 510.5    |
| Chemical acids             | 000 ton    | -        | -        | -        | 632.5    | 1,194.6  | 1,007.6  |
| Iron                       | 000 ton    | 86.2     | 134.9    | 192.7    | 209.9    | 164.9    | 198.4    |
| Metallic pipes             | ton        | 11,800.0 | 15,800.0 | 12,534.0 | 12,916.0 | 14,667.0 | 14,198.0 |
| Electric power             | mill.KWh   | 1,051.4  | 1,174.9  | 1,387.2  | 1,699.9  | 1,967.0  | 2,154.4  |
| Cigarettes                 | mill.cig.  | 4,188.3  | 4,711.4  | 4,613.7  | 4,067.4  | 4,341.9  | 3,538.1  |
| Fodder                     | 000 ton    | 47.9     | 55.4     | 63.6     | 60.9     | 61.2     | 45.9     |
| Spirits & alcoholic drinks | 000 liter  | 6,776.1  | 9,005.8  | 9,483.9  | 7,158.2  | 7,202.0  | 5,547.2  |
| Detergents                 | ton        | 15,264.8 | 18,809.5 | 15,245.3 | 12,715.0 | 25,498.1 | 15,002.4 |
| Paper & cardboard          | ton        | 8,774.1  | 15,385.4 | 14,991.8 | 11,926.0 | 18,013.0 | 21,087.0 |
| Textiles                   | 000 yard   | 1,641.2  | 1,308.0  | 1,123.5  | 1,130.6  | 1,314.5  | 2,249.0  |
| Spinning                   | ton        | 762.3    | 667.6    | 571.9    | 1,151.8  | 1,831.1  | 1,660.3  |
| Upper leather              | 000 sq.ft. | 2,502.7  | 2,107.4  | 2,268.3  | 2,334.4  | 2,145.7  | 1,937.8  |
| Sole leather               | ton        | 103.0    | 118.3    | 38.8     | 37.2     | 43.9     | 29.3     |
| Liquid batteries           | 000 batt.  | 66.3     | 57.3     | 40.4     | 36.5     | 50.1     | 49.6     |

Source : Annual Reports 1984 &amp; 1985, Central Bank of Jordan

Table A-9 CONSUMER PRICE INDEX

(1980=100)

|  | All Items | Food  | Housing | Clothing | Beverages<br>& Tobacco | Other goods<br>& services |
|--|-----------|-------|---------|----------|------------------------|---------------------------|
| Relative weight                                | 100.0     | 42.2  | 35.0    | 6.6      | 1.0                    | 15.2                      |
| 1981   | 107.7     | 108.1 | 102.9   | 129.3    | 109.9                  | 109.7                     |
| 1982   | 115.7     | 113.2 | 111.1   | 133.3    | 128.4                  | 124.1                     |
| 1983   | 121.5     | 116.1 | 120.9   | 138.0    | 165.6                  | 131.3                     |
| 1984   | 126.2     | 118.4 | 127.3   | 138.7    | 172.0                  | 140.2                     |
| 1985   | 130.0     | 121.0 | 131.5   | 138.5    | 196.8                  | 147.8                     |
| Average annual increase rate(%)<br>(1980-1985) | 5.4       | 3.9   | 5.6     | 6.7      | 14.5                   | 8.1                       |

Source : Annual Reports 1984 &amp; 1985, Central Bank of Jordan.

Table A-10 WHOLESALE PRICE INDEX IN AMMAN

(1979=100)

| Items                         | Relative weight | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  |
|-------------------------------|-----------------|-------|-------|-------|-------|-------|-------|
| Cereal and pulses             | 8.1             | 108.0 | 105.7 | 110.4 | 109.7 | 107.9 | 121.9 |
| Vegetables                    | 3.6             | 123.1 | 109.9 | 118.4 | 137.2 | 142.0 | 127.1 |
| Fruits                        | 7.0             | 106.1 | 107.1 | 106.1 | 125.9 | 132.3 | 125.9 |
| Meat and fish                 | 9.3             | 112.4 | 131.7 | 136.5 | 136.7 | 141.6 | 136.1 |
| Dairy products & eggs         | 4.6             | 109.7 | 119.5 | 127.9 | 132.3 | 134.7 | 138.0 |
| Soft & alcoholic drinks       | 1.3             | 113.8 | 119.0 | 199.4 | 199.4 | 206.3 | 245.7 |
| Other foodstuffs              | 7.4             | 110.0 | 128.8 | 129.6 | 129.2 | 134.7 | 128.9 |
| Cigarettes                    | 3.5             | 104.9 | 117.3 | 133.9 | 177.7 | 178.1 | 205.2 |
| Clothes & textiles            | 7.5             | 105.0 | 118.5 | 113.9 | 114.4 | 112.0 | 109.8 |
| Pharmaceutical drugs          | 2.5             | 100.4 | 105.1 | 111.5 | 110.1 | 108.4 | 119.2 |
| Footwear & leather products   | 0.5             | 110.8 | 118.5 | 125.3 | 133.2 | 139.9 | 145.4 |
| Paper & cardboard             | 5.5             | 100.7 | 102.2 | 91.3  | 86.9  | 92.6  | 93.2  |
| Wood                          | 2.6             | 133.2 | 154.1 | 143.0 | 133.2 | 131.2 | 130.4 |
| Construction materials        | 24.3            | 121.1 | 124.7 | 123.9 | 126.3 | 127.9 | 127.9 |
| Fuels                         | 5.1             | 170.5 | 247.6 | 281.1 | 297.8 | 298.8 | 318.5 |
| Detergents                    | 1.0             | 113.4 | 118.7 | 120.9 | 120.2 | 120.9 | 121.2 |
| Durable consumer goods        | 2.6             | 102.9 | 106.0 | 111.5 | 113.7 | 113.8 | 111.2 |
| Transport equipment           | 3.6             | 100.0 | 105.4 | 110.7 | 121.8 | 126.3 | 131.2 |
| Overall index                 | 100.0           | 114.9 | 125.3 | 129.3 | 134.5 | 136.7 | 138.8 |
| Comparison with previous year |                 | 114.9 | 109.1 | 103.2 | 104.0 | 101.6 | 101.5 |

Source : Annual Reports 1984 &amp; 1985, Central Bank of Jordan.

Table A-11 EXTERNAL TRADE OF JORDAN

Unit : Million JD

| Item                              | 1980     |       | 1981     |       | 1982     |       | 1983     |       | 1984     |       | 1985     |       |
|-----------------------------------|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------|
|                                   | Value    | %     | Value    | %     | Value    | %     | Value    | %     | Value    | %     | Value    | %     |
| <u>Domestic exports (1)</u>       | 120.11   | 100.0 | 169.03   | 100.0 | 185.58   | 100.0 | 160.09   | 100.0 | 261.06   | 100.0 | 255.35   | 100.0 |
|                                   | %(13.5)  |       | (13.1)   |       | (13.2)   |       | (12.2)   |       | (19.2)   |       | (18.4)   |       |
| Consumer goods                    | 54.23    | 45.1  | 76.72    | 45.4  | 88.15    | 47.5  | 94.25    | 58.8  | 167.71   | 64.2  | 160.49   | 62.9  |
| Raw materials                     | 51.25    | 42.7  | 76.70    | 45.4  | 78.97    | 42.6  | 59.50    | 37.2  | 82.68    | 31.7  | 80.77    | 31.6  |
| Capital goods                     | 14.63    | 12.2  | 15.53    | 9.2   | 18.43    | 9.9   | 6.34     | 4.0   | 10.67    | 4.1   | 14.09    | 5.5   |
| Miscellaneous                     | --       | -     | 0.08     | -     | 0.03     | -     | --       | -     | --       | -     | --       | -     |
| <u>Re-exports (2)</u>             | 51.34    | -     | 73.61    | -     | 78.95    | -     | 50.50    | -     | 29.60    | -     | 55.54    | -     |
|                                   | %(5.8)   |       | (5.7)    |       | (5.6)    |       | (3.3)    |       | ((2.2)   |       | (4.0)    |       |
| <u>Imports (3)</u>                | 715.98   | 100.0 | 1,047.50 | 100.0 | 1,142.49 | 100.0 | 1,103.31 | 100.0 | 1,071.34 | 100.0 | 1,074.45 | 100.0 |
|                                   | %(80.7)  |       | (81.2)   |       | (81.2)   |       | (84.0)   |       | (78.7)   |       | (77.6)   |       |
| Consumer goods                    | 240.16   | 33.5  | 325.21   | 31.0  | 368.30   | 32.2  | 365.06   | 33.1  | 383.21   | 35.3  | 369.30   | 34.4  |
| Raw materials                     | 227.09   | 31.7  | 305.52   | 29.2  | 380.28   | 33.3  | 377.79   | 34.2  | 419.16   | 39.1  | 420.41   | 39.1  |
| Capital goods                     | 246.74   | 34.5  | 414.96   | 39.6  | 391.40   | 34.3  | 310.55   | 28.2  | 239.03   | 22.3  | 261.08   | 24.3  |
| Miscellaneous                     | 1.99     | 0.3   | 1.81     | 0.2   | 2.51     | 0.2   | 49.91    | 4.5   | 29.94    | 2.8   | 23.66    | 2.2   |
| Amount of trade                   | 887.43   |       | 1,290.14 |       | 1,407.02 |       | 1,313.90 |       | 1,362.00 |       | 1,385.34 |       |
|                                   | %(100.0) |       | (100.0)  |       | (100.0)  |       | (100.0)  |       | (100.0)  |       | (100.0)  |       |
| Difference of Exports and imports |          |       |          |       |          |       |          |       |          |       |          |       |
| (1)+(2)-(3)                       | -544.53  |       | -804.86  |       | -877.96  |       | -892.72  |       | -780.68  |       | -763.56  |       |

Source : Annual Reports 1984 &amp; 1985, Central Bank of Jordan.

Table A-12 MAIN EXPORT ITEMS

Unit : Million JD

| Items                  | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   |
|------------------------|--------|--------|--------|--------|--------|--------|
| Industrial and mining  |        |        |        |        |        |        |
| exports of which :     | 95.82  | 134.94 | 145.87 | 122.81 | 218.39 | 211.70 |
| Phosphate rock         | 47.20  | 54.79  | 57.15  | 51.61  | 69.61  | 66.08  |
| Wood frames            | 5.81   | 6.97   | 5.38   | 2.83   | 7.77   | 8.52   |
| Cigarettes             | 5.12   | 5.59   | 4.90   | 3.53   | 4.00   | 1.72   |
| Pharmaceuticals        | 3.17   | 5.99   | 8.67   | 8.52   | 11.48  | 14.30  |
| Varnish                | 2.63   | 2.88   | 2.47   | 2.56   | 2.13   | 1.47   |
| Fertilizers            | --     | --     | 5.19   | 20.67  | 44.01  | 30.59  |
| Soap & soap powder     | 4.58   | 6.07   | 3.85   | 1.95   | 5.62   | 1.57   |
| Potash                 | --     | --     | --     | --     | 14.94  | 30.89  |
| Others                 | 27.31  | 52.65  | 58.26  | 31.14  | 58.83  | 56.56  |
| Agricultural exports   |        |        |        |        |        |        |
| of which :             | 24.29  | 34.09  | 39.71  | 37.28  | 42.67  | 43.65  |
| Tomatoes               | 5.39   | 6.67   | 7.19   | 6.47   | 6.75   | 6.08   |
| Citrus fruits          | 5.94   | 8.72   | 7.38   | 5.59   | 6.20   | 5.88   |
| Eggplant               | 1.25   | 1.61   | 1.86   | 1.23   | 1.67   | 1.51   |
| Squash                 | 1.00   | 1.35   | 2.06   | 1.56   | 1.25   | 1.23   |
| Cucumber               | 0.97   | 1.91   | 2.81   | 2.96   | 3.08   | 3.02   |
| Others                 | 9.74   | 13.83  | 18.41  | 19.47  | 23.72  | 25.93  |
| Total domestic exports | 120.11 | 169.03 | 185.58 | 160.09 | 261.06 | 255.35 |

Source : Annual Reports 1984 &amp; 1985, Central Bank of Jordan.

Table A-13 GEOGRAPHICAL DISTRIBUTION OF EXTERNAL TRADE

Unit : Million JD

| Country                      | 1980   |       | 1981     |       | 1982     |       | 1983     |       | 1984     |       | 1985     |       |
|------------------------------|--------|-------|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------|
|                              | Value  | %     | Value    | %     | Value    | %     | Value    | %     | Value    | %     | Value    | %     |
| Domestic exports             | 120.11 | 100.0 | 169.03   | 100.0 | 185.58   | 100.0 | 160.09   | 100.0 | 261.06   | 100.0 | 255.35   | 100.0 |
| Arab Common Market countries | 12.15  | 35.3  | 74.75    | 44.2  | 80.55    | 43.4  | 30.58    | 19.1  | 72.05    | 27.6  | 74.17    | 29.0  |
| Other Arab countries         | 30.46  | 25.4  | 39.73    | 23.5  | 42.75    | 23.0  | 56.47    | 35.3  | 60.52    | 23.2  | 57.36    | 22.5  |
| E.E.C.                       | 2.10   | 1.7   | 2.46     | 1.5   | 3.57     | 2.0   | 8.13     | 5.1   | 10.41    | 4.0   | 11.39    | 4.5   |
| Socialist countries          | 15.15  | 12.6  | 19.47    | 11.5  | 25.41    | 13.7  | 21.22    | 13.2  | 32.78    | 12.5  | 21.50    | 8.4   |
| India                        | 8.04   | 6.7   | 10.32    | 6.1   | 16.56    | 8.9   | 13.75    | 8.6   | 34.11    | 13.1  | 45.31    | 17.7  |
| Japan                        | 3.95   | 3.3   | 3.85     | 2.3   | 3.78     | 2.0   | 3.40     | 2.1   | 5.55     | 2.1   | 5.82     | 2.3   |
| Others                       | 17.96  | 15.0  | 18.45    | 10.9  | 12.96    | 7.0   | 26.54    | 16.6  | 45.64    | 17.5  | 39.80    | 15.6  |
| Imports                      | 715.98 | 100.0 | 1,047.50 | 100.0 | 1,142.49 | 100.0 | 1,103.31 | 100.0 | 1,071.34 | 100.0 | 1,074.45 | 100.0 |
| Arab Common Market countries | 18.91  | 2.6   | 18.69    | 1.8   | 16.00    | 1.4   | 24.51    | 2.2   | 19.98    | 1.9   | 83.16    | 7.7   |
| Other Arab countries         | 130.32 | 18.2  | 194.38   | 18.6  | 253.78   | 22.2  | 226.11   | 20.5  | 225.72   | 21.1  | 180.41   | 16.8  |
| E.E.C.                       | 259.73 | 36.3  | 339.53   | 32.4  | 329.59   | 28.8  | 330.09   | 29.9  | 319.25   | 29.8  | 314.55   | 29.3  |
| Other European countries     | 49.53  | 6.9   | 58.76    | 5.6   | 69.14    | 6.1   | 52.73    | 4.8   | 87.90    | 8.2   | 88.94    | 8.3   |
| U.S.A.                       | 61.59  | 8.6   | 166.67   | 15.9  | 144.34   | 12.6  | 131.05   | 11.9  | 119.26   | 11.1  | 128.05   | 11.9  |
| Socialist countries          | 49.80  | 6.9   | 81.19    | 7.8   | 94.83    | 8.3   | 77.32    | 7.1   | 64.80    | 6.0   | 74.38    | 6.9   |
| India                        | 1.94   | 0.3   | 2.07     | 0.2   | 2.34     | 0.2   | 1.46     | 0.1   | 1.25     | 0.1   | 1.78     | 0.2   |
| Japan                        | 51.34  | 7.2   | 71.53    | 6.8   | 87.37    | 7.7   | 102.89   | 9.3   | 79.06    | 7.4   | 67.81    | 6.3   |
| Others                       | 92.82  | 13.0  | 114.68   | 10.9  | 145.10   | 12.7  | 156.65   | 14.2  | 154.12   | 14.4  | 135.37   | 12.6  |

Source : Annual Reports 1984 &amp; 1985, Central Bank of Jordan.

Table A-14 INTERNATIONAL BALANCE OF PAYMENTS

Unit: Million JD

| Item   | 1980     |          | 1981     |          | 1982     |          | 1983     |          | 1984*    |          | 1985*    |          |
|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|  | Credit   | Debit    | Credit   | Debit    | Credit   | Debit    | Credit   | Debit    | Credit   | Debit    | Credit   | Debit    |
| A- Goods & services                              | 744.13   | 1,031.26 | 1,037.87 | 1,482.36 | 1,121.93 | 1,613.49 | 1,103.92 | 1,540.17 | 1,257.95 | 1,640.84 | 1,221.55 | 1,636.46 |
| 1. Goods   | 171.45   | 714.79   | 242.62   | 1,046.36 | 264.53   | 1,141.12 | 210.59   | 1,101.96 | 290.66   | 1,069.19 | 310.89   | 1,072.51 |
| 2. Non-monetary gold                             | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        |
| 3. Travel  | 154.92   | 107.85   | 180.84   | 121.55   | 183.48   | 131.28   | 183.05   | 132.43   | 173.22   | 146.45   | 204.17   | 166.42   |
| 4. Investment income                             | 37.69    | 23.50    | 66.25    | 37.63    | 72.08    | 39.43    | 62.94    | 45.37    | 38.84    | 62.13    | 39.59    | 74.59    |
| 5. Government                                    | 8.41     | 74.67    | 11.54    | 138.80   | 10.28    | 120.50   | 8.08     | 89.63    | 7.80     | 115.80   | 3.09     | 81.07    |
| 6. Other transportation costs                    | 76.46    | 42.22    | 101.23   | 63.18    | 117.47   | 95.28    | 108.77   | 78.28    | 137.95   | 116.63   | 155.98   | 121.62   |
| 7. Other services (of which workers remittances) | 295.20   | 68.23    | 435.39   | 74.84    | 474.09   | 85.88    | 530.49   | 91.50    | 609.48   | 129.64   | 507.83   | 120.25   |
|  | (236.63) | (45.00)  | (340.39) | (52.00)  | (381.87) | (52.40)  | (402.90) | (72.80)  | (475.00) | (97.50)  | (402.92) | (52.95)  |
| Trade balance (1-2)                              | 543.34   | -        | 359.25   | 803.74   | 385.03   | 876.59   | 455.12   | 891.37   | 395.64   | 778.53   | 345.71   | 761.62   |
| Net services (3-7)                               | 256.21   | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        |
| Net goods & services (1-7)                       | 287.13   | 2.25     | 432.46   | 1.66     | 375.36   | 2.07     | 296.70   | 1.86     | 282.56   | 3.80     | 317.54   | 2.53     |
| B- Unrequited transfers (Foreign aid receipts)   | 10.15    | 2.25     | 17.13    | 1.66     | 11.64    | 2.07     | 7.23     | 1.86     | 20.86    | 3.80     | 26.36    | 2.53     |
| Private  | -        | -        | 415.33   | -        | 363.72   | -        | 289.56   | -        | 261.70   | -        | 291.18   | -        |
| Government                                       | 390.85   | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        |
| Net total (A+B)                                  | 111.62   | -        | 69.04    | 13.69    | 113.40   | 118.27   | 156.76   | 141.32   | 64.37    | 104.13   | 137.64   | 99.90    |
| C- Capital movement                              | 32.04    | -        | 46.87    | 0.05     | 32.98    | 12.15    | 13.70    | 2.82     | 29.92    | 1.02     | 9.65     | -        |
| Private  | 11.66    | 2.37     | 318.21   | 295.99   | 316.19   | 223.62   | 315.64   | 169.76   | 287.40   | 251.93   | 352.12   | 224.13   |
| Government                                       | 196.46   | 173.71   | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        |
| SDRs   | 1.21     | -        | 1.21     | -        | -        | -        | -        | -        | -        | -        | -        | -        |
| Net total (A-D)                                  | 144.87   | -        | 56.56    | -        | 62.36    | 4.87     | 15.44    | 50.30    | 69.30    | 39.76    | 37.74    | 18.53    |
| E- Monetary sector                               | 110.06   | -        | -        | 15.25    | -        | -        | -        | -        | -        | -        | -        | -        |
| F- Net errors & Omissions                        | 34.81    | -        | -        | 41.31    | -        | 57.49    | 34.86    | -        | -        | 29.54    | -        | 19.21    |

\* Preliminary

Source : Annual Reports 1984 &amp; 1985, Central Bank of Jordan.

Table A-15 GOVERNMENT BUDGET

Unit : Million JD

| Item  | 1980   | 1981   | 1982   | 1983   | 1984*  | 1985*  |
|---|--------|--------|--------|--------|--------|--------|
| Public revenues:                              | 507.02 | 598.47 | 627.20 | 676.66 | 666.79 | 842.45 |
| Domestic revenues                             | 226.15 | 309.20 | 362.04 | 399.97 | 412.95 | 434.46 |
| Tax revenues                                  | 174.67 | 232.97 | 263.13 | 293.61 | 305.87 | 327.62 |
| Indirect taxes                                | 139.80 | 184.20 | 209.35 | 237.13 | 245.57 | 257.62 |
| Direct taxes                                  | 34.87  | 48.77  | 53.78  | 56.48  | 60.30  | 70.00  |
| Non-tax revenues                              | 51.48  | 76.23  | 98.91  | 106.36 | 107.08 | 106.84 |
| External revenues                             | 280.87 | 282.04 | 264.86 | 273.81 | 247.37 | 396.37 |
| Budget support                                | 202.83 | 206.31 | 199.59 | 196.68 | 106.11 | 194.87 |
| Economic & technical assistance               | 2.00   | -      | -      | -      | -      | -      |
| External loans                                | 71.57  | 75.73  | 65.27  | 77.13  | 141.26 | 201.50 |
| Expected loans & assistance                   | 4.47   | -      | -      | -      | -      | -      |
| Other revenues                                | -      | 7.23   | 0.15   | 2.88   | 6.47   | 11.62  |
| Public expenditures:                          | 563.14 | 647.10 | 693.55 | 705.27 | 729.44 | 818.77 |
| Current expenditures                          | 336.05 | 391.47 | 442.97 | 453.67 | 485.21 | 541.96 |
| Defence & public security                     | 137.03 | 161.47 | 182.51 | 196.00 | 196.77 | 219.01 |
| Recurring civil expenditures                  | 93.20  | 115.52 | 129.17 | 145.45 | 140.77 | 16.93  |
| Other expenditures                            | 105.82 | 114.48 | 131.29 | 112.22 | 147.67 | 162.02 |
| Capital expenditures (ordinary & development) | 227.09 | 255.63 | 250.58 | 251.60 | 244.23 | 276.81 |
| Surplus or deficit                            | -56.12 | -48.63 | -66.50 | -28.61 | -62.65 | 23.68  |

\* Preliminary

Source : Annual Reports 1984 &amp; 1985, Central Bank of Jordan.