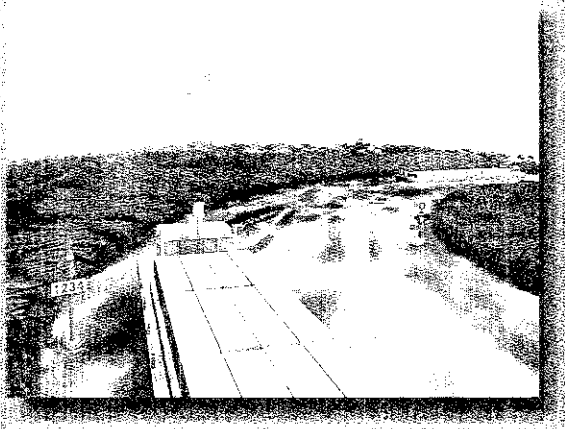
Japan International Cooperation Agency (JICA)
River Transport Authority (RTA)

FINAL REPORT

DEVELOPMENT PLAN OF INLAND WATERWAY TRANSPORT (IWT)

THE DEVELOPMENT STUDY ON THE INLAND WATERWAY SYSTEM IN THE ARAB REPUBLIC OF EGYPT



March 2003

The Overseas Coastal Area Development Institute of Japan (OCDI)
Pacific Consultants International (PCI)

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(As of 2002)

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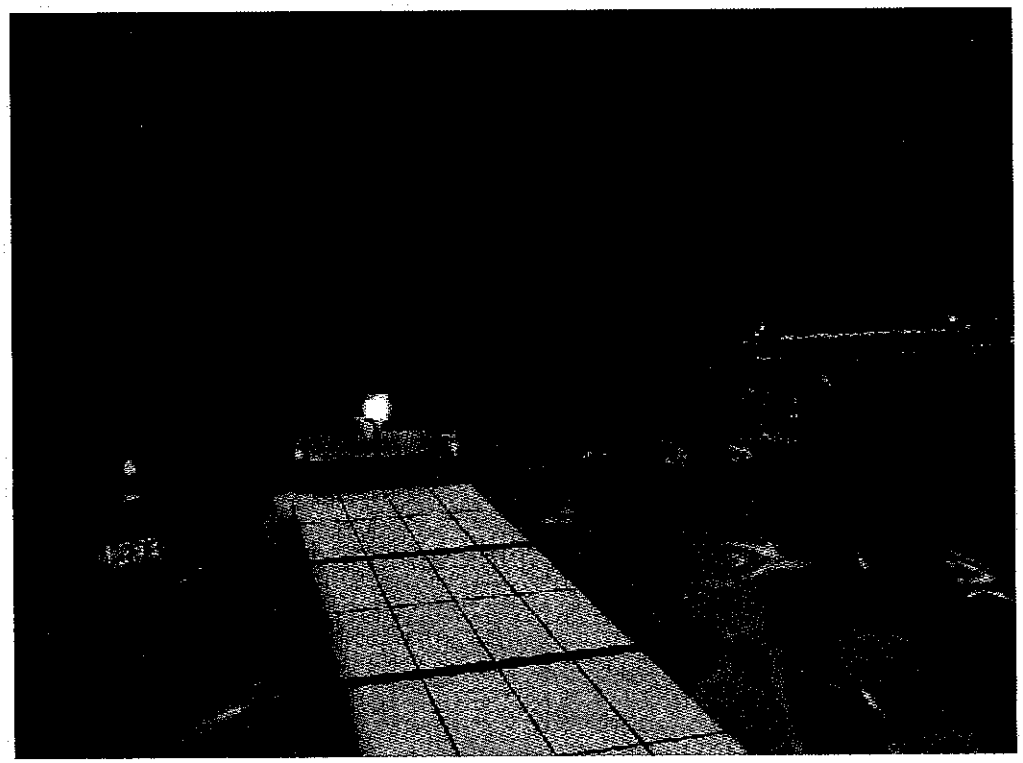
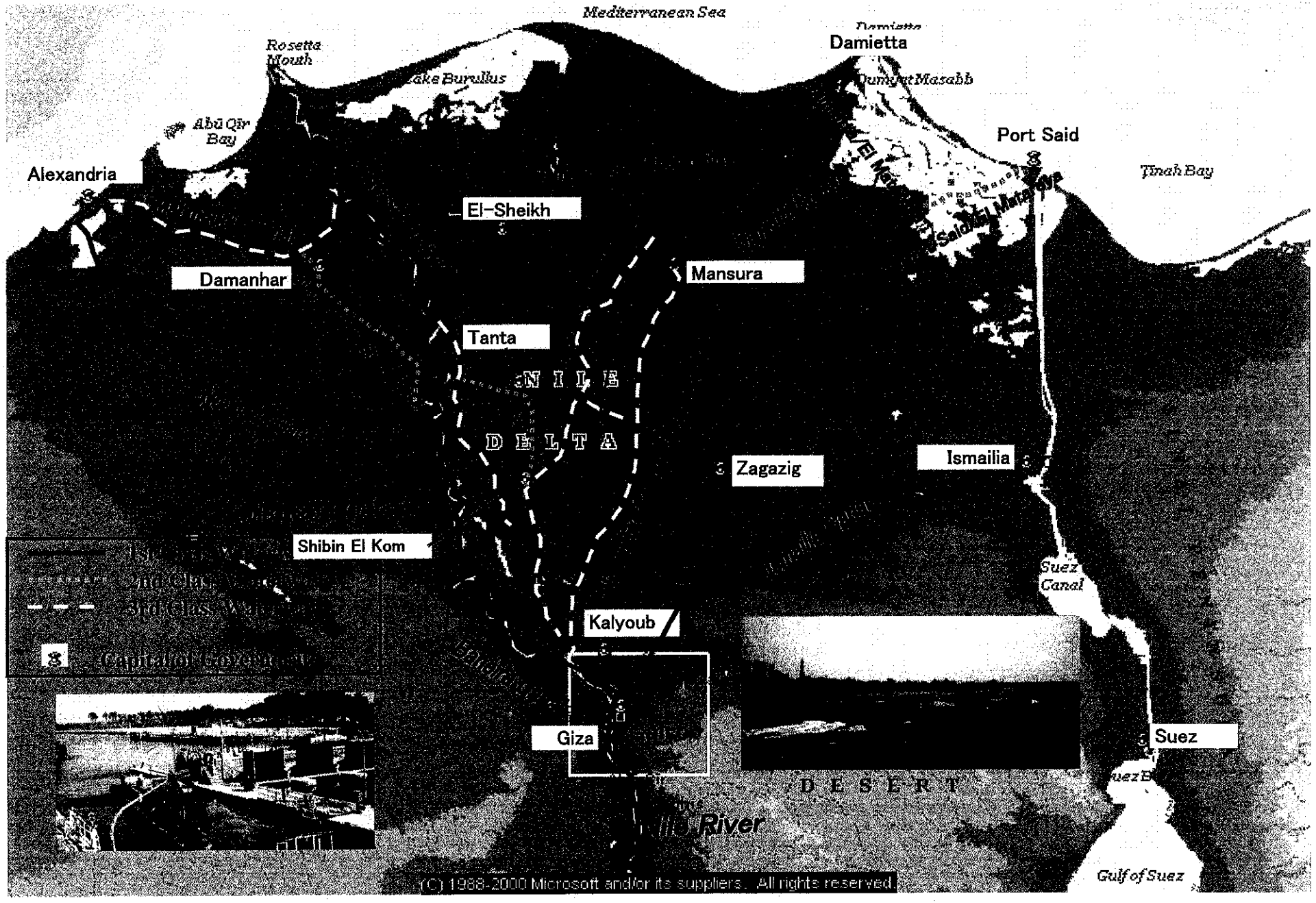




Sketch Map of Inland Waterway Network in the Nile Delta

PREFACE

In response to a request from the Government of the Arab Republic of Egypt (hereinafter referred to as "GOE"), the Government of Japan decided to conduct the Study on the inland waterway system in the Arab Republic of Egypt and entrusted the study to the Japan International Cooperation Agency (JICA).

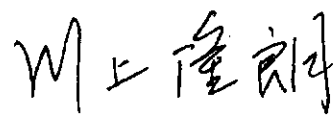
JICA selected and dispatched a study team headed by Dr. Haruo OKADA (hereinafter referred to as "the Study Team") of the Overseas Coastal Area Development Institute of Japan (OCDI) and comprised of OCDI and Pacific Consultants International (PCI) to Egypt three times between December 2001 and December 2002.

The team held discussions with the officials concerned of the GOE and conducted the field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of GOE for their close cooperation extended to the team.

March 2003



Takao Kawakami

President

Japan International Cooperation Agency

LETTER OF TRANSMITTAL

March 2003

Mr. Takao Kawakami
President
Japan International Cooperation Agency

Dear Mr. Kawakami

It is my great pleasure to submit herewith the Final Report of the Development Study on the Inland Waterway System in the Arab Republic of Egypt".

The Study Team of the Overseas Coastal Area Development Institute of Japan (OCDI) and Pacific Consultants International (PCI) conducted surveys in Egypt over the period between December 2001 and December 2002 according to the contract with the Japan International Cooperation Agency (JICA).

The Study Team compiled this report, which proposes the future development scenario including Master Plan and Short-term Plan for the promotion of Inland Waterway Transport (IWT) system in the Delta area up to 2020 and 2010 respectively, through close consultation with officials of the River Transport Authority (RTA) and other authorities concerned.

On behalf of the Study Team, I would like to express my heartfelt appreciation to RTA and other authorities concerned of the Government of the Arab Republic of Egypt for their diligent cooperation, assistance and heartfelt hospitality, which they extended to the Study Team.

I am also greatly indebted to the Japan International Cooperation Agency, the Ministry of Foreign Affairs, the Ministry of Land, Infrastructure and Transport, and the Embassy of Japan in the Arab Republic of Egypt for valuable suggestions and assistance during the course of the Study.

Yours faithfully,

Haruo Okada
Team Leader
The Development Study on the Inland Waterway System in the Arab Republic of Egypt

LIST OF ABBREVIATIONS

AfDB	African Development Bank
AfDF	African Development Fund
APA	Alexandria Port Authority
BOD	Biochemical Oxygen Demand
CAIP	Cairo Air Improvement Project
°C	Centigrade
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COD	Chemical Oxygen Demand
DANIDA	Danish International Development Agency
DO	Dissolved Oxygen
DPA	Damietta Port Authority
EEAA	Egyptian Environmental Affairs Agency
EIA	Environmental Impact Assessment
EIMP	Environmental Information and Monitoring Program
EMTP	Environmental Monitoring Training Project
ENR	Egyptian National Railway
GDP	Gross Domestic Product
GHG	Greenhouse Gas
HC	Hydrocarbon
Hp	Horse Power
IEE	Initial Environmental Examination
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
LE	Egyptian Pounds
Nr	Number
Lin.m	Linear Meter
l.s	Lump Sum
MARPOL	International Convention for the Prevention of Pollution from Ships
m	Meter
m2	Square Meter
m3	Cubic Meter
mm	Milimeter
MOT	Ministry of Transport
MT	Metric Tons
m/s	Meter per Second

MWRI	Ministry of Water Resource & Irrigation
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
O_3	Ozone
PM	Particulate Matter
PSPA	Port Said Port Authorty
%	Percent
RTA	River Transport Authority
sec	Second
SO_2	Sulfur Dioxide
TDS	Total Dissolved Solids
TEU	Twenty Feet Equivalent Unit
THC	Total Hydrocarbon
TOC	Total Organic Carbon
TN	Total Nitrogen
TP	Total Phosphorus
TSP	Total Suspended Particulate
TSS	Total Suspended Solids
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development

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Chapter 9 Conceptual Development Plan of Inland Waterway Transport (IWT)

9.1 General

In general, transport systems can be seen as basic infrastructures that link together the various regions of the world. This has become increasingly important in the global age.
Needless to say, it is vital to strengthen international gateways in order to secure access to world markets. Thus, transport systems play a key role in nationwide and regional development and should be developed in accordance with long-term national development plans. Moreover, it is necessary to improve entire inland transport system on the basis of appropriate role-sharing among each transport mode and between the public and private sectors.

Meanwhile, main purpose of the study is to formulate a long-term master plan of Inland Waterway Transport (IWT) for the target year 2020. Firstly, it is necessary to indicate development guidelines taking account of above-mentioned factors such as national land structure, role-sharing of transport modes and private sector participation.

In this chapter, such guidelines including policies or strategies are defined as a conceptual plan. The main purpose of this conceptual plan is to determine roles/objectives of IWT in 2020 in light of the following factors:

- National Land Structure such as distribution of population and future land use
- Basic characteristics of each transport mode such as IWT, road and railway
- Relation between navigational use and irrigational one of Inland Waterway (IW)

In Section 9.2, present situations of national-land structure and Egyptian transport networks are summarized. Secondly, Section 9.3 briefly indicates basic roles of inland transport networks such as road, railway and IWT. Consequently, four major roles of IWT are taken up in Section 9.4 as follows:

- Establishment of an economical and energy efficient transport system to cope with the increasing demand for cargo transport among major seaports, GCR (Greater Cairo Region) and inland industrial areas
- Establishment of a reliable and safe mass transport system all year round
- Establishment of a transport system that is attractive to private barge operators
- Easing of environmental problems

In the conceptual plan, it is considered that key axes of IWT are connection of major seaports with the Cairo Region followed by that of the Nile mainstream.

9.2 Relation between National Land Structure in Egypt and Inland Transport Networks

9.2.1 National Land Structure in Egypt

(1) Geographical Conditions in Egypt

Egypt is located in an area of geographical importance and serves as the node of the three continents of Europe, Africa, and Asia. In the Mediterranean Sea, the country is at the core of Mediterranean Arab countries. In addition, the Suez Canal, a major international trade route, also belongs to the country.

Egyptian government is making an attempt to promote trade liberalization and expansion by fully utilizing its strategic location. The increasing of such overseas trade has heightened the importance of seaports as international gateways in order to secure access to the world. Egyptian seaports on the Mediterranean are expected to play a key role of the growth in the seaborne trade between European Union and other surrounding countries. Meanwhile, there is a strong likelihood that the development of trade between Asia-Pacific countries will lead to a boost of seaports on the Red Sea.

For Egyptian inland transport to play a part in such overseas trade, it is necessary to promote inter-modal transportation from/to major seaports.

(2) National Land Structure

The country is almost square in shape, stretching 1,240km from east to west, and 1.024 km from north to south; the total area is about 1 million square km. However, cultivated and residential areas occupy just 5.5 % of the national land and are mostly limited to the Nile Delta and the Nile Valley with an average width of 10km. Most of the remaining area are barren zones such as desert areas.

- **Population**

The population density in inhabited areas is high, and the majority of socio-economic activities are concentrated in these areas, which represent only 5.5% of national land. Population in 2000 is estimated at 63.8 million people, of which 32% of the population is distributed along the Nile Valley and about 67% in the Nile Delta (see Figure 9.2.1(1) and 9.2.1(2)).

Inland transport system has a great importance for widespread activities in many sectors in populated areas.

Figure 9.2.1(1) Distribution of Population by governorates in 2000

Estimation by JICA Study Team

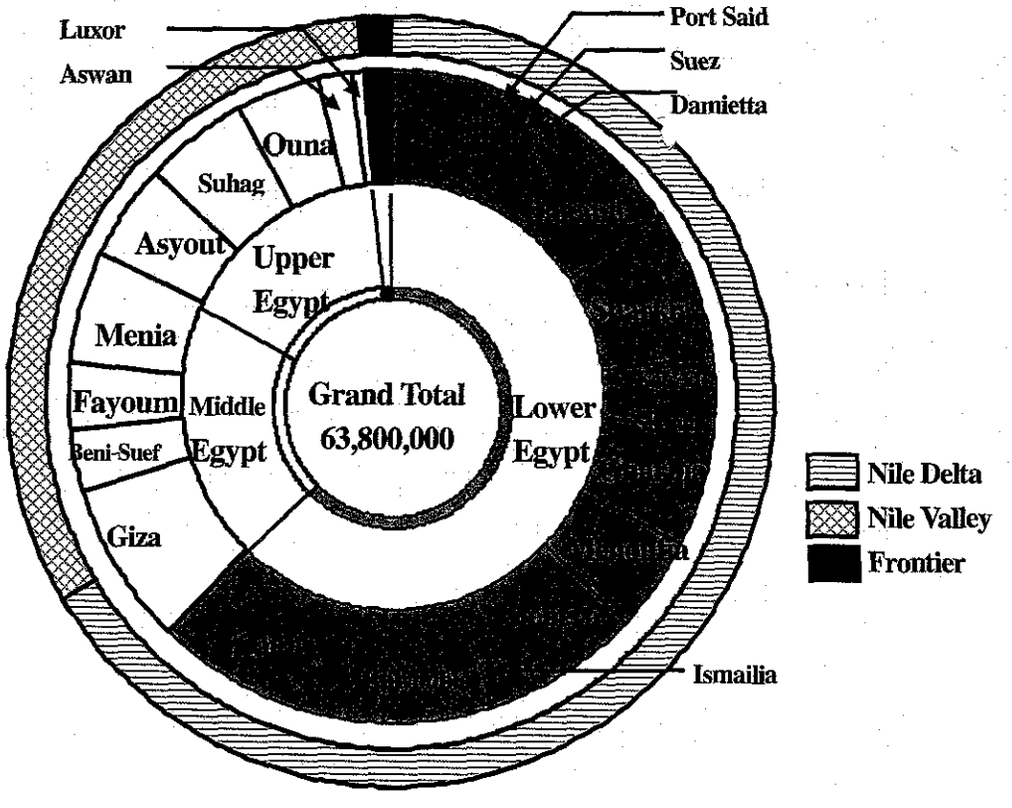

Figure 9.2.1(2) Distribution of Population by Region in 2000

Estimation by JICA Study Team

Though population growth has been slowing down gradually (the annual average rate from 1986 to 1999 was 2.08 %), it is necessary to develop the transportation system to promote economic expansion and improve living standards in the future.

➢ **Future Land Use**

It is not too much to say that the land development in Egypt is the history of expansion of the cultivated and residential areas. In recent years, there is an accelerated drive to newly develop land in order to further stimulate economic growth. "Egypt in the 21st Century", the government's long-term national development plan, is summarized in Chapter 2. One of strategies of this plan is to increase utilized land for agricultural, industrial, tourism and other purposes for the target year of 2017.

As shown in Figure 9.2.2, basic policy of future land use places great emphasis on the development of the following areas:

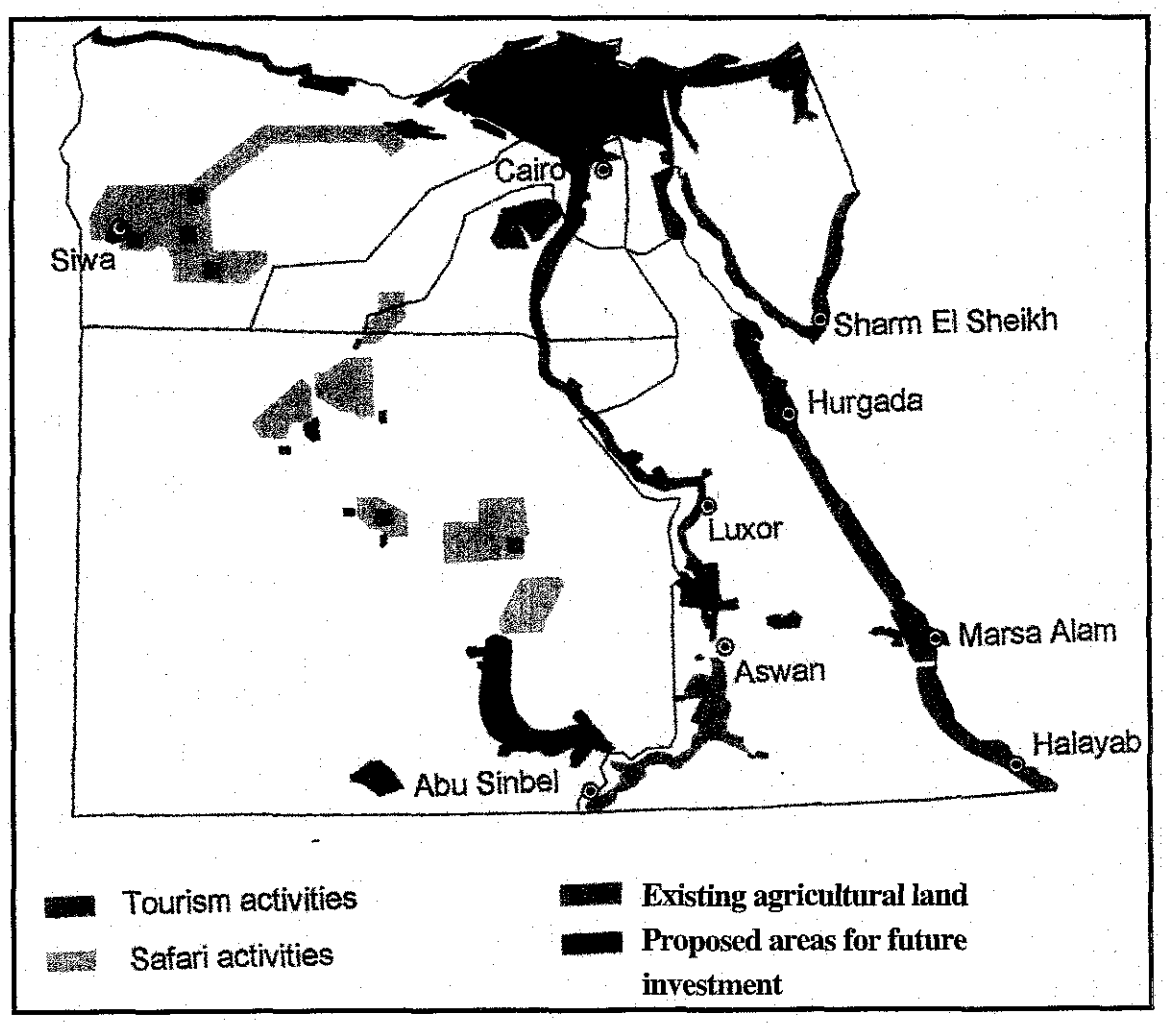

Figure 9.2.2 Sketch Map of Future Land Use

- Western and Eastern Area adjacent to boundaries of the Delta
- Suez Gulf region

- Northern Area of Sinai Peninsula
- South-western Area adjacent to boundaries of the Old Valley

In above proposed areas, some projects including new industrial cities/areas, free zones and agricultural developments are being developed or in the planning stage. To step up efforts to develop such new areas and lands, the inland transport network is vital.

The tourism sector will be developed as one of the key industries in the country with the Red Sea and the Western Desert regions earmarked as priority areas (see Figure 9.2.2). Improvements in the inland transport network are also vital to the success of the tourism industry.

9.2.2 Present Conditions of Inland Transport Networks

This sub-section mainly outlines inland transport networks such as road, railway and IW (Inland Waterway).

(1) Road

Egyptian nationwide road network has been expanded vertically and horizontally in order to facilitate regional growth in agricultural, industrial, tourism and other sectors. Needless to say, the road network has been well-developed in the Nile Delta and the Nile Valley in the context of the afore-mentioned Egyptian land structure today (see Figure 9.2.3).

In the Nile Delta, road infrastructure consists of a radial network that connects the Greater Cairo Region (hereinafter referred to as "GCR") to the major seaport cities on the Mediterranean coast, and radial trunk lines link with major cities in the Delta.
Meanwhile, Middle / Upper Egypt areas have trunk roads (Nationwide principal roads) which link each major city such as capitals of governorates along the Nile Valley from the GCR to Aswan.

Egyptian government is making full efforts to improve afore-mentioned existing trunk lines in order to cope with growth in traffic volume, and giving priority to improvements of inter-city network.

In addition, Ministry of Transport (MOT) is putting great emphasis on strengthening horizontal lines which connect the Red Sea region including Suez Gulf area with the Nile Delta / Valley, and improving access to new developing areas such as industrial cities or free zones. In the road sector, one of the important issues is to deal with the increase in urban-traffic volume. The improvement of GCR's road network is typical of such urban road projects.

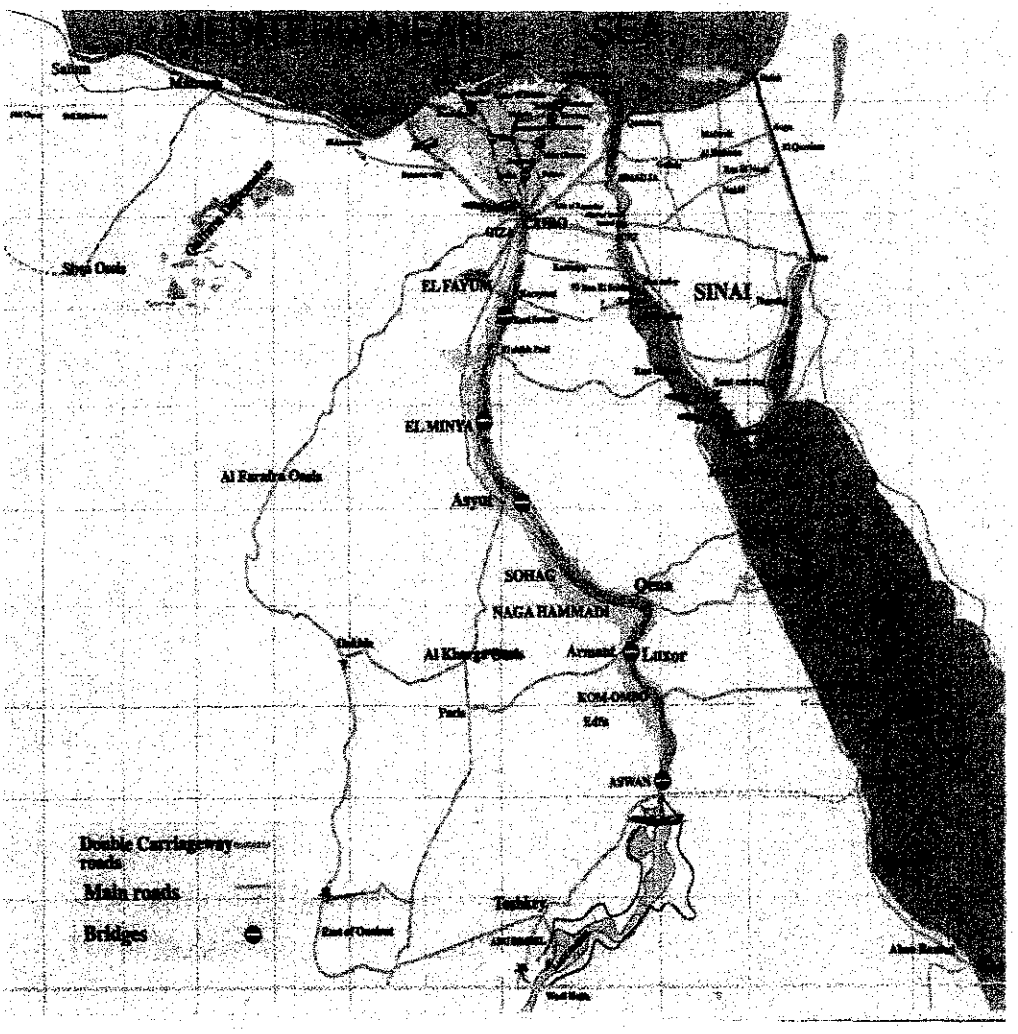

Figure 9.2.3 Sketch Map of Nationwide Road Network

Source) "Achievements of the Transport & Communications Sector", MOT

(2) Railway

Egyptian railway has a glorious history where Cairo-Alexandria line started in 1851 and its line is first track services in Africa, the Middle East, and the Arab region.

Nowadays, railway network has been basically developed almost parallel to road lines in the Delta, the Valley and even desert areas. Each line is categorized as a Main line, Urban/Suburban line or Branch line according to its roles in the railway network (see Figure 9.2.4).

Based on passenger/cargo transport volumes, the key routes are: "Cairo-Aswan (El Sad El Ali)", "Cairo-Alexandria" and "Cairo-Port Said (via Ismailia)" lines. Meanwhile, some branch lines in rural areas face difficult competition with road transport because of the limited demand in these areas.

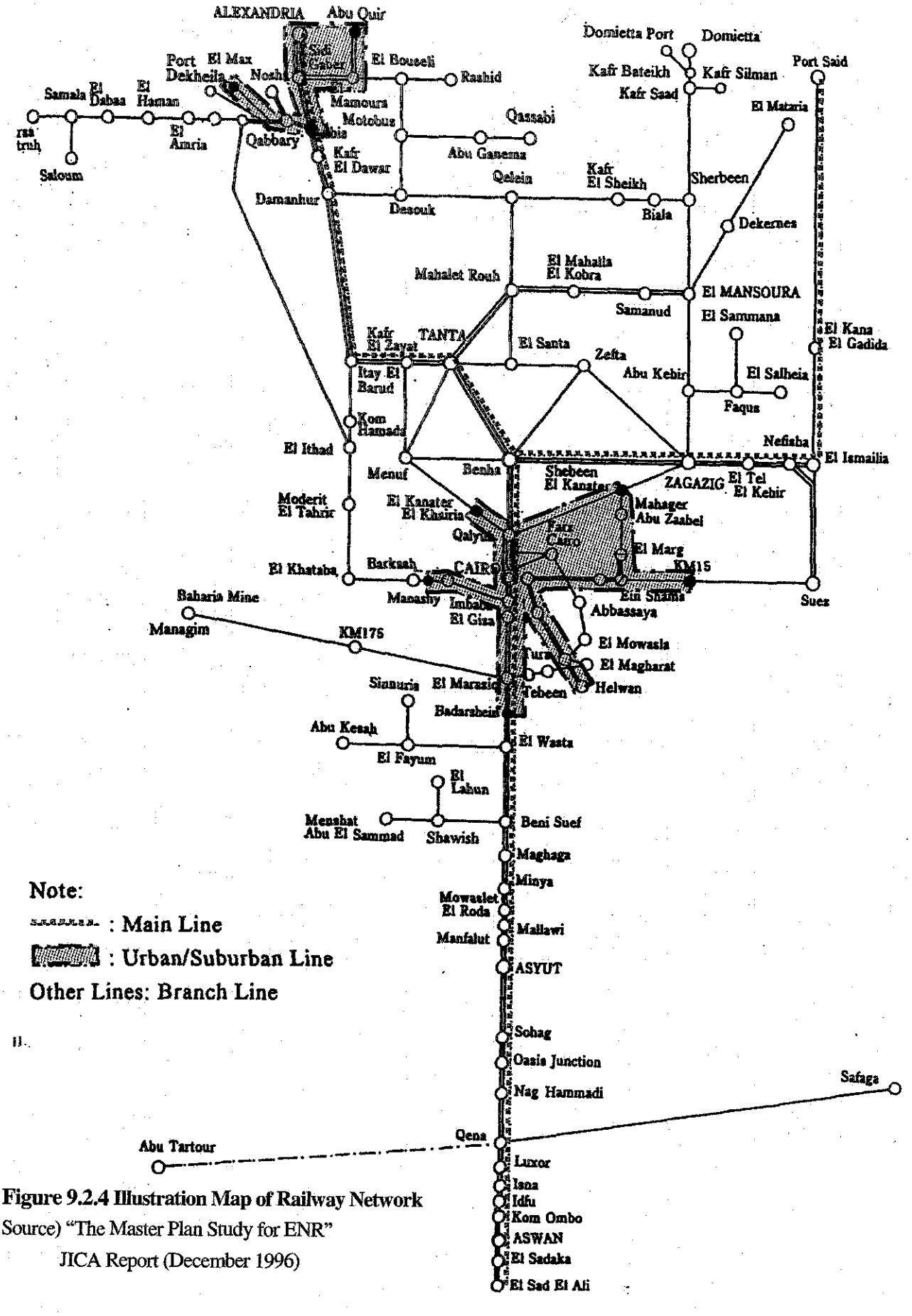

Figure 9.2.4 Illustration Map of Railway Network

Source) "The Master Plan Study for ENR"
JICA Report (December 1996)

Under these circumstances, MOT and ENR (Egyptian National Railways) have given priority to the establishment of a sound management and operation system. On the other hand, ENR is making efforts to improve its infrastructures such as main lines and some regionally important branch lines and to construct new lines to link the Red Sea, Sinai Peninsula and other large-scale newly developing areas.

Moreover, railway sector has also put great emphasis on increasing the carrying capacity of urban/suburban lines in Greater Cairo and Alexandria region.

(3) Inland Waterway (IW)

Trunk routes of IW seem to have been formed parallel to other modes' networks. However, only Aswan-Cairo and Alexandria-Cairo IWs currently play the role of trunk route of waterborne transportation as a 1st class IW. Former IW is a vertical line from Aswan to GCR connecting governorates' capital cities while the role of the latter one is to link GCR with the largest seaport. When the "Damietta Project" is completed, three (3) waterborne transport axes will be active in the Valley, West and East Delta.

Meanwhile, not all 2nd or 3rd class waterways were constructed along major cities or cores in the Delta. In other words, not all IWs are conveniently located for transport axes where a significant amount of cargo is generated/attracted. Similarly, physical requirements of these IWs are not necessarily adequate for navigational use since they were originally planned taking account of water requirements for agricultural purposes.

Moreover, the navigational conditions of 1st class waterways are likely to depend on water management. For instance, dredging program of "Damietta Project" has been made in consideration of the future water distribution plan by MWRI.

An important feature of Egyptian IW is that irrigational use has priority over navigational use in terms of planning and designing. To formulate a long-term development plan, one of the major premises is the relation between IW transport and irrigational utilization.

9.3 Major Roles of Each Transport Mode

9.3.1 Roles of Egyptian Inland Transport

This sub-section summarizes roles of inland transport sector in light of globalization and socio-economic reforms.

The world is moving towards a global age in various activities. In this global age, Egypt is expected to boost traditional industries, to create new industries and to raise the international competitiveness of national industries. Basic roles of transport sector are to support industrial development, and contribute to economic expansion improvements in living standards in the future.

Since 1990s, the government has introduced socio-economic reforms which are steadily moving the country towards a market economy and increased privatization. In the transport sector, private companies already play an important role in road transport while privatization in the maritime sector is steadily progressing. In IWT sector, the drive for such reforms including the privatization of barge operators has just started. Railway sector is likely to face some reforms due to such privatization in the transport market.

Under these circumstances, competition will become increasingly severe among three modes, and users will demand greater cost savings in transport. In addition, improving the quality of services such as reliability, punctuality, speed, door-to-door service and responding to other needs of customers will needed in order to successfully compete.

Therefore, modal share (choice) by users basically depends on transport cost and afore-mentioned service level. In the demand forecast in Chapter 10, it is considered that modal share will be changed according to transport cost and time by each mode.

9.3.2 Major Roles of Each Transport Mode

As shown in afore-mentioned sub-section, the country is divided broadly into three (3) areas: the Nile Delta, the Valley and other regions. Therefore, roles of each transport mode are summarized according to these three areas.

The three transport modes are almost parallel in structure in the Nile Delta (see Figure 9.3.1) and are also developed parallel to one another along the Valley. Therefore, in order to survive keen competition with one another, each mode will have to capitalize on its competitive advantages.

(1) Nile Delta Area

As described in Section 9.2, the roles of inland transport system in the Delta are quoted as follows:

- To efficiently link with overseas trade:
  To improve inter-modal transportation from/to major seaports

- To support widespread activities in populated areas:
  To cope with growth in inter-city freight (cargo) and passenger transport
  To ensure access to new development areas
  To meet the increase in urban traffic volume

Each transport system has advantages based on its characteristics. From the viewpoint of transport-distance, truck transport is generally superior to other modes in case of "short-range transport" while IW / railway gain an advantage over road transport in "long-haul transport".
In addition, mass-transport of a single-commodity is generally more economical by IW or railway. Therefore, IW / railway sectors have an advantage in the field of bulky cargo transportation while the strong point of trucks is small-lot transportation.

On the basis of general characteristics of inland transport modes, the major roles are summarized as follows:

Major roles of each mode in the Delta Area

- **Transportation from/to major seaports in the Mediterranean**

As described in a later section, loaded/unloaded cargoes at major seaports are largely transported between GCR (Greater Cairo Region) and each seaport. The volume of cargo is expected to further increase with the expansion of overseas trade in future.
Therefore, it is most important for each transport mode to make a strategy for gaining its share in cargoes between GCR and seaports. For instance, "Damietta Project" by RTA, "strengthening of branch lines to access grain silos" by ENR, and "various studies on containers transportation" are efforts to attract overseas cargo through seaports.

Meanwhile, transport-distances between GCR and seaports are approximately estimated at just over 200 km, which would seem to fall under the category of "short-range transportation" (See Figure 9.3.1).

Although it is no easy matter for IWT to compete with road or railway sectors where the transport distance is only 200 km, it is considered that IWT can gain some modal-share in transportation between GCR and Mediterranean seaports, on condition that IWT sector targets specific

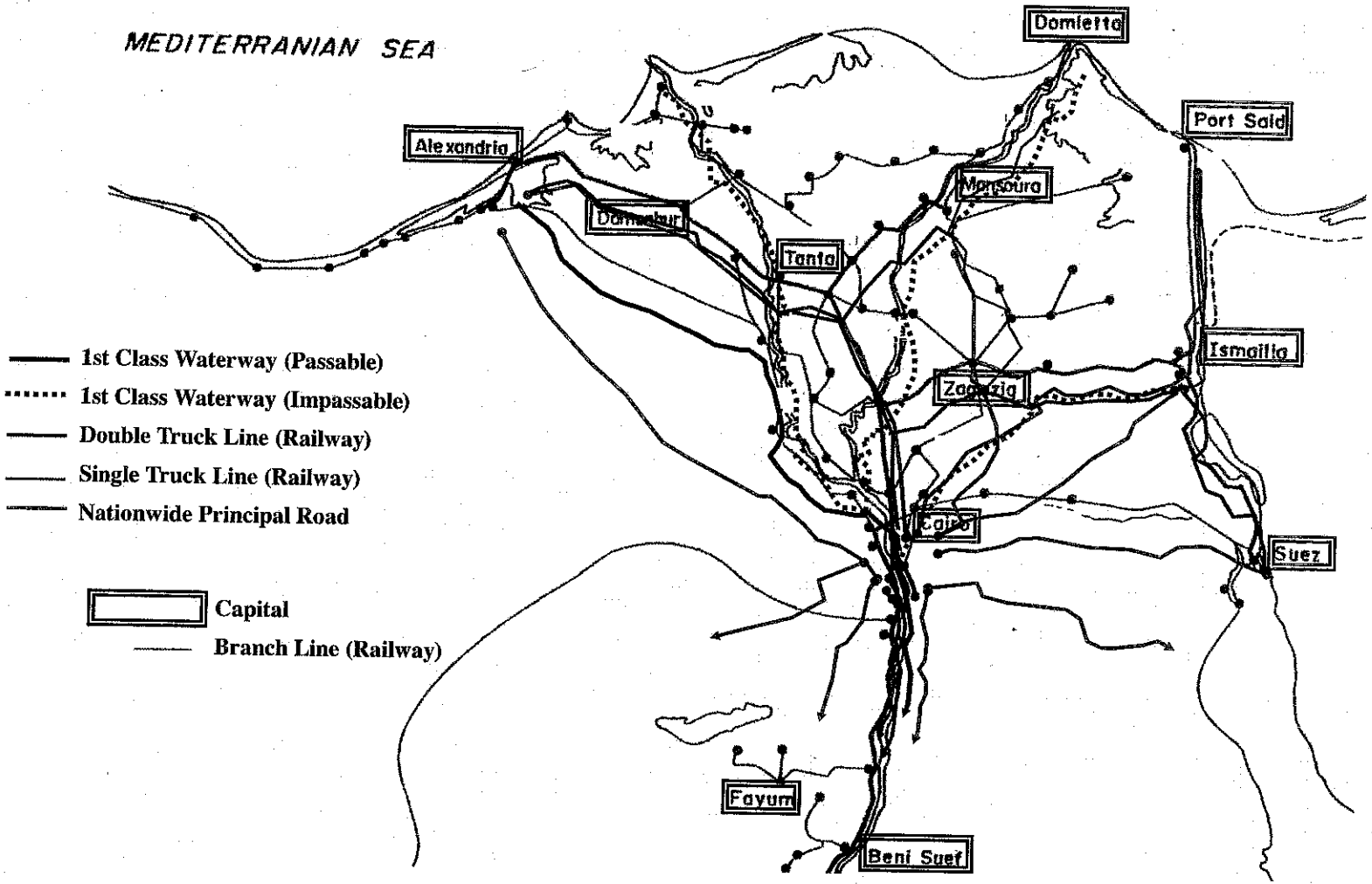

Figure 9.3.1 Sketch Map of Transportation Networks in the Nile Delta at 2001

commodities and improves infrastructures, operational and managerial systems. Therefore, the Study focuses on such improvement measures of IWT in the later chapters.

In other words, all three modes have a possibility of transporting goods between GCR and seaports. Such feasibility depends on its targeted commodities, package type, annual cargo volume and other factors of transportation.
In consideration of such factors, modal share is analyzed based on transport cost and time by each mode (see the demand forecast in Chapter 10 for details).

➢ **Domestic Transportation in the Delta Area**

As for passenger transport in the Delta, road and railway will play a key role as in the past. Role of IWT sector would be limited to exceptional routes such as water buses within GCR and some rural lines.

Similarly, it is considered that inter-city freight (cargo) transport will be basically conducted by road and railway sectors. It would be difficult for the IWT sector to compete with trucks in inter-city transport such as the cargo movement between capitals of Governorates for the following reasons:

- Difficulty in attracting sufficient cargo: it is no easy matter to gain an advantage of "mass transport"
- Short-range transport: IWT sector's traditional strength is "long-haul transport"

Regarding access to new development areas such as industrial cities/areas, road infrastructure has been overwhelmingly developed to link with such development areas and is ahead of the railway sector.

Needless to say, the important role of road and railway sectors is to cope with the increase of traffic volume in urban/suburbs areas.

(2) Nile Valley Area

Along the Nile Valley, three (3) transport modes provide the major national axes for linking capitals of Governorates, traditional industrial areas and other regional cores such as tourism sites.

In the Middle / Upper Nile areas, river transport has played indispensable roles from ancient times. Along the Nile mainstream, 1st class waterways, main routes of railway and roads are all in good condition.
Moreover, in this area, there are a large number of factories handling raw materials, semi-processed

goods and products. Tourism sector in this area will play a key role in supporting the regional economy as in the past. One of the roles in inland transport is to facilitate the development of such regional industries.

On the basis of above regional characteristics of each mode, the major roles are summarized as follows:

Major roles of each mode in the Valley Area

- **Long-haul Transportation along the Valley**

In the field of "long-haul transport", some bulky cargoes which are raw materials or products of factories are carried to/from GCR or directly to/from seaports. In addition, general cargoes such as consumer goods are expected to increase in line with the growth of the regional economy and to be transported from GCR or Seaports.

Such long distance transport is the strength of IWT and railway compared with truck transportation. Therefore, IWT sector should continuously focus on strengthening its role in "long -haul transport" along the Valley.

- **Inter-city Transportation along the Valley**

Regarding cargo and passenger movement between cities along the Valley, road and railway will play a key role as well as in the Delta area. In this field, IWT sector has room to transport bulky cargoes more efficiently.

- **Enhancement of Tourism Industry**

The tourist movement is expected to expand on the strength of the huge historical resources in this area. All modes should be improved in order to promote the tourism industry along the Valley. Moreover, the Nile River is a very valuable tourism resource itself and the river cruise are likely to increase.

For this reason, it will be important to control the movements cruise ships, oil barges and other bulk barges in an efficient and safe manner.

(3) Other Areas

In this sub-section, roles of inland transport sector in the Red Sea including the Suez Gulf, Sinai Peninsula and desert area are briefly described.

In the above areas, new projects to develop new seaports, industrial cities, free zones, agricultural lands and tourism sites are underway or in the planning stage.

Major roles of each mode in Other Areas

Road network has superior links with the above-mentioned development areas, while railway connections are also being enhanced for that purpose. Namely, horizontal axes have been strengthened step by step, which connect the Nile Delta/Valley with Suez Gulf, northern Sinai or other areas.

Meanwhile, it is considered that IWT sector will basically leave transportation in these areas to other modes within the target period of the conceptual plan. Because, in these areas, the realization of barge transportation will inevitably mean that large investment for IWs must be assumed for the purposes of not only water management but also navigational use.

9.4 Major Roles of IWT in 2020

In above-mentioned sub-sections, the roles or functions of inland transport were indicated in consideration of national land development and other factors.
Consequently, major four roles of IWT in 2020 are taken up in this section as follows:

- Establishment of an economical and energy efficient transport system to cope with the increasing demand for cargo transport among major seaports, GCR and inland industrial areas
- Establishment of a reliable and safe mass transport system all year round
- Establishment of a transport system that is attractive to private barge operators
- Easing of environmental problems

As for each role, its significance is outlined as follows:

9.4.1 Establishment of an Economical and Energy-Efficient Transport System for Cargo Transport among major seaports, GCR and Inland Industrial Areas

In general, the advantage of IWT over road transport lies in its cost effectiveness and energy efficiency due to mass transportation. However, the modal share of IWT has recently been decreasing in Egypt.

In the conceptual plan, the first task is the establishment of an economical and energy-efficient system. As mentioned in Section 9.3.1, savings in transport costs will become increasingly essential in order to survive competition with other modes. In addition, economical and efficient transport system enables Egyptian society to improve international competitiveness.
Needless to say, energy-efficient system has the advantage of lower fuel-consumption and such a system is expected to have two beneficial effects: lower transport costs due to the decrease in fuel expenses and reduced emissions such as GHG (Green House Gases) and other air pollutants. These are benefits that can be enjoyed both by the transport sector and Egyptian society at large.

Improvement measures to retrieve advantages of IWT are individually described in subsequent chapters. Thus this sub-section indicates basic policy to establish such an IWT system.

First, cost-efficiency should be increase by making efforts to attract more "mass-transport" cargoes. In the conceptual plan, it is considered that strategies for achievement of cost-efficiency be formed on the basis of the following aspects.

- To focus on routes between major seaports and GCR as paramount IWT axes
- To target specific commodities which are appropriate for barge operations and for making barge business viable
- To enlarge the size of barges and to improve IW infrastructures to meet requirements of newly

enlarged barges

Basic strategies based on above aspect are summarized as follows:

(1) To focus on routes between major seaports and GCR

To gain more "mass-transport" cargoes, IWT sector should focus on the larger inland transport axes which shape principal routes in the country, namely; "Alexandria – Cairo", "Damietta – Cairo" and "Port Said – Cairo". These routes can be effectively used for "mass-transport" axes because the terminals of these routes generate and attract much of the cargo in Egypt (see Figure 9.4.1 (1) and (2)).

It is considered that the conceptual plan gives first priority to the former two axes ("Alexandria-GCR", "Damietta-GCR" IWs) in view of current cargo volume at each seaport.

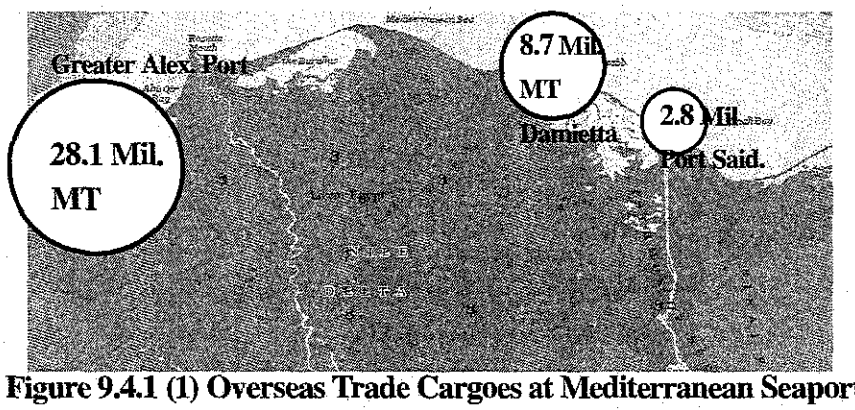

Figure 9.4.1 (1) Overseas Trade Cargoes at Mediterranean Seaports in 2000

Source: Estimated by the Study Team

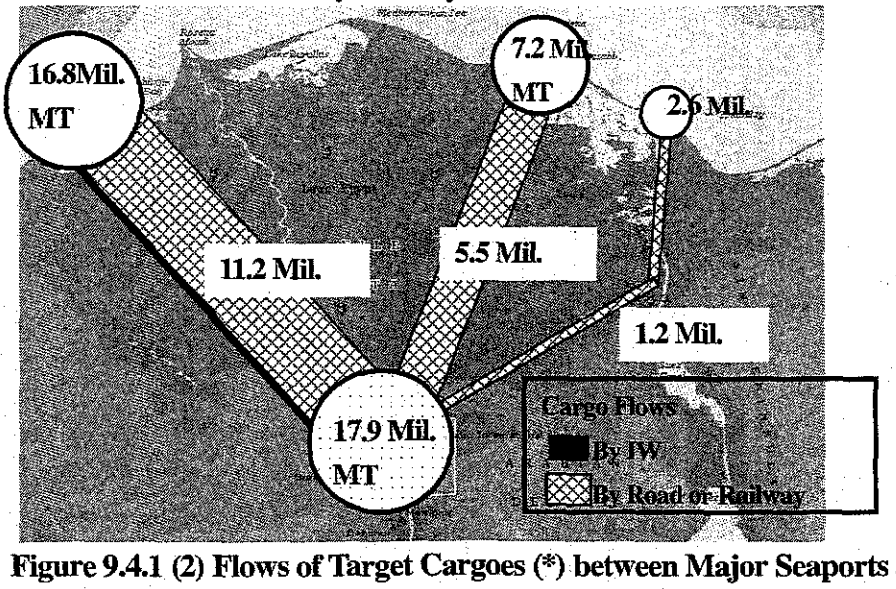

Figure 9.4.1 (2) Flows of Target Cargoes (*) between Major Seaports and GCR in 2000

Source: Estimated by the Study Team *Target Cargoes are explained in detail in a later section.

"Port Said-GCR" IW seems to rank lower than former IWs on the basis of demand forecast of

handling volume at the port for the year 2020 (see Chapter 10 for detail).

(2) To target specific commodities

As mentioned previously, such major IWs between seaports and GCR face stiff competition with well-developed roads/railways in parallel with IWs. On the other hand, IWT is able to transport goods economically, though its shortcomings compared with other modes are lower-speed and necessity for double-handling/secondary distribution. Moreover, such advantages or disadvantages can change depending on cargo flow patterns because its patterns between seaports and customers are different by cargo commodities.

Therefore, IWT sector should fully utilize its major advantage of cost-saving while overcoming its disadvantages as much as possible. For that purpose, IWT sector should concentrate on specific commodities in consideration of cargo characteristics and advantage / disadvantage of IWT.
Efforts should be made to establish appropriate systems for such specific commodities in order to further improve transport efficiency, and intensive-transport will be achieved by focusing on such specified cargoes.

In the study, such commodities are identified as "target (potential) cargo" (see Chapter 10 for details). The above Figure 9.4.1 (1) and (2) shows overseas trade cargo at the Mediterranean seaports and transportation volume of target cargo between seaports and GCR in 2000 respectively.

(3) To enlarge the size of barges and to improve IW infrastructures

In general, one of the effective measures to save transport cost is to increase the transportation lot; in other words, enlarging the size of barges. In the Egyptian IWT sector, river barges became increasingly larger until 1960s -70s.

However, the drive to introduce larger-sized barges seems to be stagnant in recent years. The prime reason is likely the physical constraints of related IW infrastructures.

In the Study, one of basic strategies aims at proposing ways to enlarge river barges. This strategy is formed on the basis of an integrated examination of new barge system with improvements of IW infrastructures. Details are described in Chapter 11.

9.4.2 Establishment of a reliable and safe mass transport system all year round

As mentioned in section 9.4.1, one of the major roles for IWT is "mass transport" between seaports and GCR as the industrial arteries of the country. These "arteries" are key to Egypt's economic growth, and be expected to be utilized by main producers, factories and transporters.
Needless to say, the above major users require safe and reliable transportation such as "regular service all year round" .

In the conceptual plan, strategies for a reliable/safe system are formed on the basis of the following aspects.

- To improve IW infrastructures to secure safe and smooth navigation
- To establish flexible system of adapting to seasonal fluctuation in water depth

Basic strategies for developing IWT are outlined as follows:

(1) To improve IW infrastructures to secure safe and smooth navigation

At present, IWT is not necessarily a reliable transport system, mainly due to the following reasons:

- Insufficient IW facilities and bottlenecks can hinder barges from smooth and safe navigation.
- IWs have been frequently closed to traffic due to the maintenance of related facilities such as locks, canals, bridges and irrigation facilities.

Thus, objectives of strategies are to improve insufficient facilities, and to remove bottlenecks and obstacles to navigation as soon as possible. Needless to say, such improvement plan should be formulated in consideration of future barge system.

In addition, one of the key strategies is to capitalize on its advantage in the field of "long-haul transport". As shown in Figure 9.4.2 (1) and (2), in the Middle/Upper Nile, river transport plays indispensable roles in such "long-haul transportation". In particular, cargo transported from the Nile Valley area to the Delta that is mainly composed of raw materials, construction materials and semi-processed goods can be economically carried by river barges. However, it is reported that a lot of bottlenecks remain along the Nile mainstream.

Therefore, improvements of "long distance route" between the Valley area and the Delta area, that will serve to step up efforts to transport cargoes economically from the Upper Egypt to industrial areas in the Delta. Moreover, such improvements of the valley area will be also significant from the safe navigational aspect as it will be possible to cope with the increase in tourist boats.

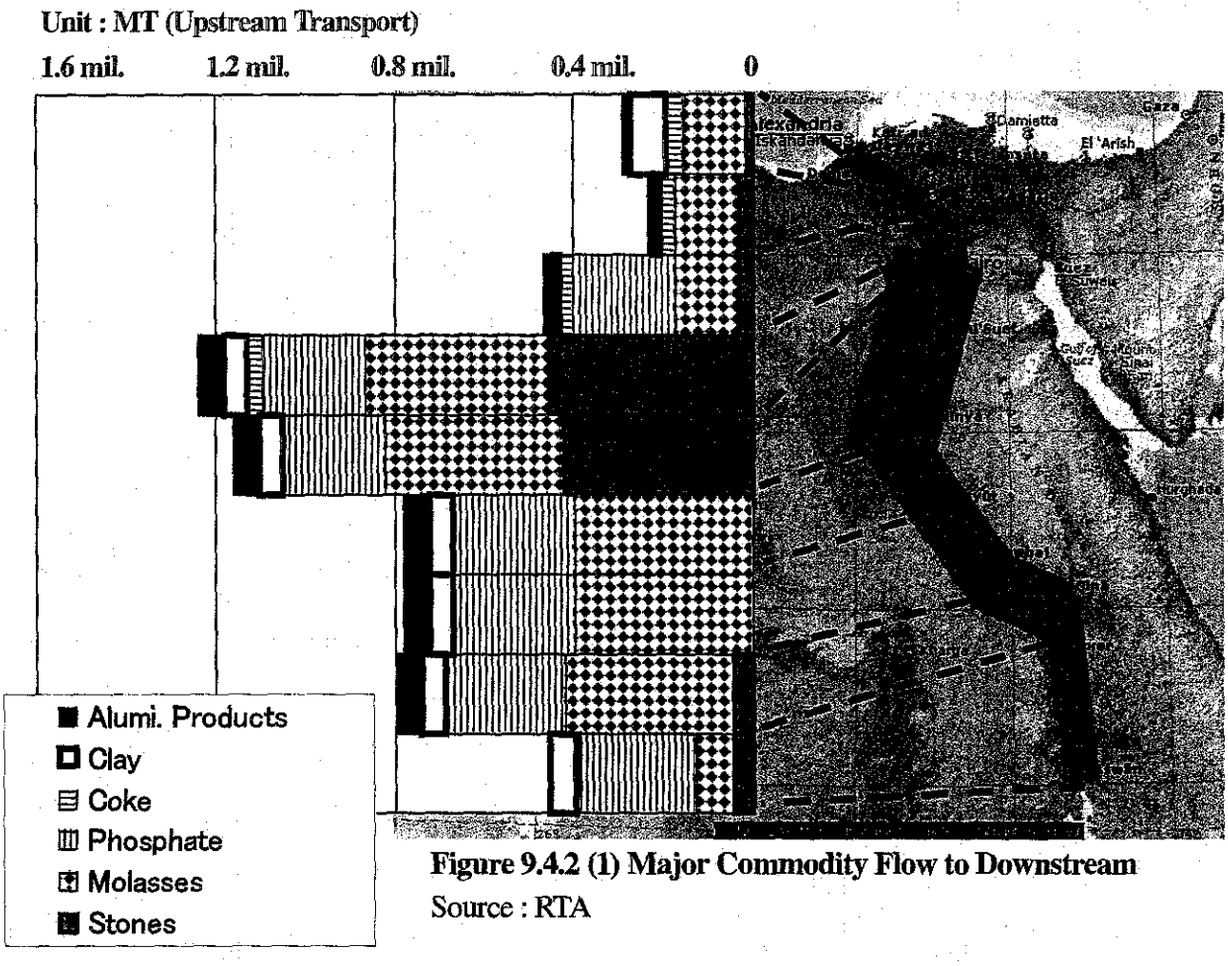

Figure 9.4.2 (1) Major Commodity Flow to Downstream
Source : RTA

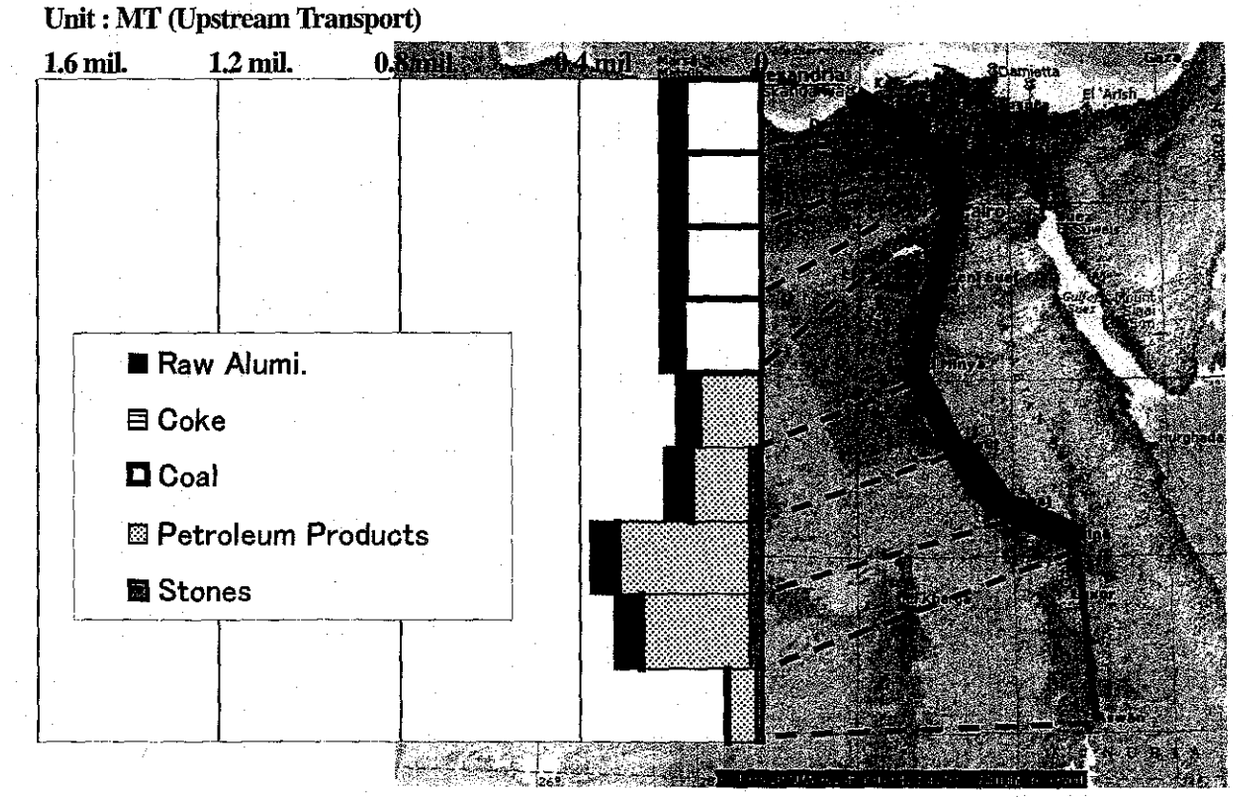

Figure 9.4.2 (2) Major Commodity Flow to Upstream Source : RTA

Secondly, within the target period of the conceptual plan, it is important to focus on only the major IWs when such improvement plans are formulated, because scattering investment in many IWs will result in further delays of strongly needed improvements in the major IWs. In the conceptual plan, it is considered that the major IWs are connections of major seaports with Cairo Region and the next important waterborne transport axis is the Nile mainstream.

Thirdly, the blockades of IWs seem to be found here and there due to the maintenance works. These works include not only IW's infrastructures but also related infrastructures by other organizations such as General Authority for Road & Bridges.
Therefore, one of the required strategies is to make an appropriate maintenance program of shortening such blockade's period as much as possible. In addition, it is essential for related organizations to coordinate with each other to draw up maintenance plans.

(2) To establish flexible system of adapting to seasonal fluctuation in water depth

At present, IWT is not necessarily a reliable system due to seasonal fluctuation in water depth, because shallow depth during the low-discharge period can hinder river barge from stable and efficient transportation. However, it seems that there is no definitive solution to this issue as long as irrigational use has priority over navigational use.

Under these circumstances, the conceptual plan aims at proposing a flexible system that can adapt to changes of water depth as much as possible.

At first, new river barge system with shallower draft is required in order to navigate during the low-discharge period smoothly and efficiently. In addition, it is essential that RTA be able to collect and announce the water-depth conditions for barge operators and other related organizations. For that purpose, a close relationship between RTA and MWRI is vital.

9.4.3 Establishment of a transport system that is attractive to private barge operators

Socio-economic reforms begun in the 1990s will have important impacts on IWT sector in the short and long term, and long-term plan for IWT should be formulated taking account of such reforms in Egypt.

In the conceptual plan, the strategies for attracting not only private barge operators but also IWT customers are summarized as follows:

(1) To improve IWT Operational and Managerial System

The Study proposes strategies that enable IWT to attract more customers and more cargoes. Executing bodies of such strategies are divided into three (3) categories: RTA as navigation way authority, related governmental organizations such as MOT, MWRI and private companies such as barge operators.
Afore-mentioned sub-sections outlined several strategies such as improvements of IWs by RTA, introduction of new barge by private operators and others. It is considered that all strategies are effective measures to attract more customers and to cultivate new markets.

In this sub-section, the strategy for improving operational and managerial system by RTA is summarized.
Egyptian transport sector has introduced night operation, except for IWT. In the maritime sector, working time of cargo handling at seaports is 24 hours for containers, or it is 16 hours for other commodities. Similarly, there are no restrictions on night operation in the road and railway sectors. However, IWT sector still has a daytime-based operational system that has only 10 hours from sunrise to sunset as working hours.
IWT is only one part of the whole transport sector. IWT can hinder the Egyptian transport system from efficient activities because other elements are forced to adjust to daytime-based operation.
Therefore, it is essential for IWT to introduce night operation to ensure more efficient transport and to compete with other modes.

In addition, it is considered the management of RTA needs to better respond to market trends and determine future policies based on customer needs.

(2) Roles of Other Governmental Organizations

It is important to clarify the roles and responsibilities of the central government such as MOT and RTA, and the private sector. Especially, support from MOT will be paramount to facilitate promotion of IWT, in other words, realization of a dramatic change in modal-shares.