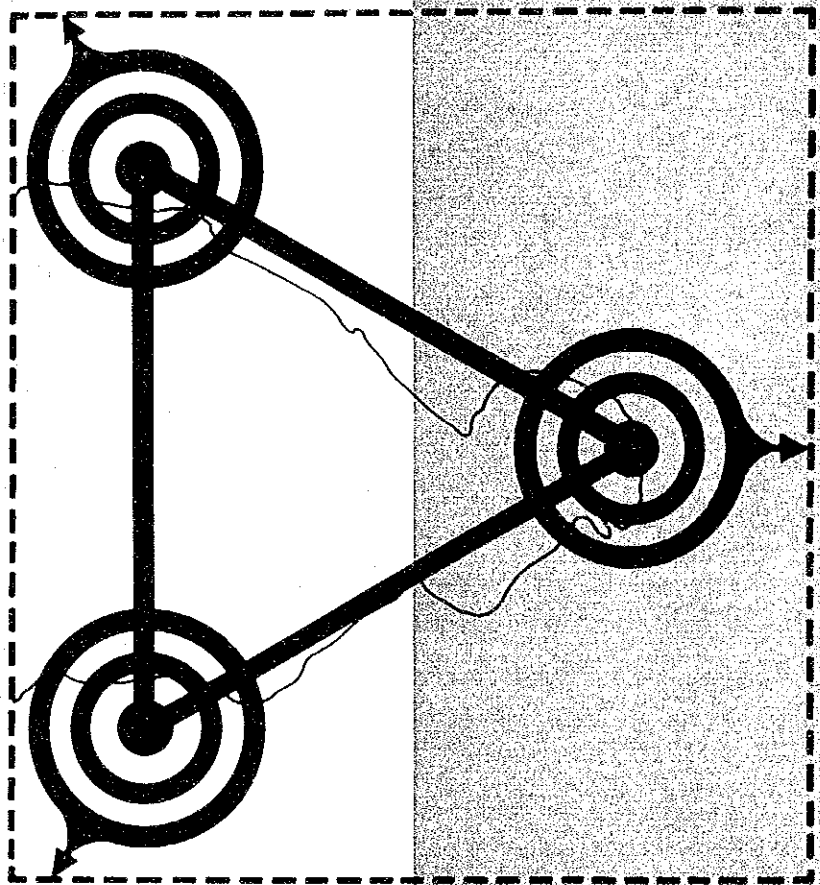
社会開発協力部報告書

No. 7

STUDY ON THE DEVELOPMENT PLAN OF SUEZ BAY COASTAL AREA



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86-76(4/4)

FINAL REPORT

STUDY ON
THE DEVELOPMENT PLAN OF
SUEZ BAY COASTAL AREA
IN THE ARAB REPUBLIC OF EGYPT

JULY 1986

VOL. IV ANNEX

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APPENDIX I

— Method of Evaluating Potential —

1.1 Method of Evaluating Potential

The method of evaluating development potential here is based on the relative locational advantage of each block for each economic activity. The relative advantage is given a numerical evaluation from 1 to 9 based on the physical characteristics of the site. Naturally, the ultimate locational decision of each economic activity will be based not only on the physical aspects of the site, but also on various economic factors such as land price, wage rate, availability of skilled labour and so on. However, the major objective of the potential evaluation here is to judge the overall relative potential of blocks in the Study Area and physical characteristics are the dominant factors. Furthermore, the current evaluation is only concerned with the coastal zone, and only those activities associated with the coastal zone are considered. It is possible that certain inland zones may exhibit very high development potential. Different factors would have to be considered to evaluate the relative advantages among the inland zones and the relative development potential of the coastal and inland zones.

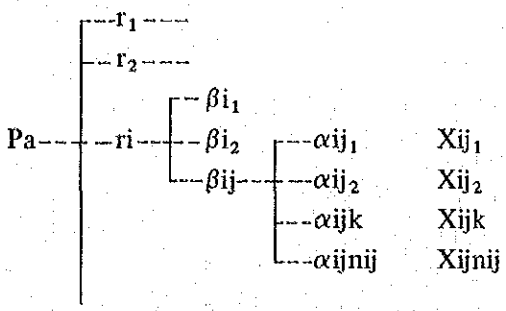
(1) Calculation Method

The development potential for each activity is calculated by summing up the weighted digits for each factor which influences the locational decision.

Each factor is given a numerical evaluation from 1 to 9, and the weight attached to each factor on the bough of the tree shows the relative importance of the factor. The calculation of the potential is as follows:

$$Pa = \sum_{i=1}^{\ell} \gamma i \left[\sum_{j=1}^{mi} \beta ij \left(\sum_{k=1}^{mij} \alpha ijk \cdot Xijk \right) \right] \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \quad (1)$$

where;
- Pa; potential of activity a
- ri; weight of factor i
- βij; weight of factor j which influences factor i
- αijk; weight of factor k which influences factor j
- Xijk; kth factor which influences the jth factor which influences factor i
- l; maximum number of factors which directly influence the potential
- mi; maximum number of factors which influence factor i
- nij; maximum number of factors which influence factor j



Note: If the weight of a factor is noted as *, then the potential of the block is regard as 0, regardless of other elements. That is, the existence of a factor noted as * means that the block is unsuitable for development because it contains irrepacable resources which must be preserved.

(2) Structure of Factors

(See Fig. 1.1.1 and Tables 1.1.1 ~ 1.1.5)

(3) Results

The calculated potential for each activity is shown in Fig. 1.1.2 ~ 1.1.7.

Fig. 1.1.1 Weighted Tree for Potential Evaluation

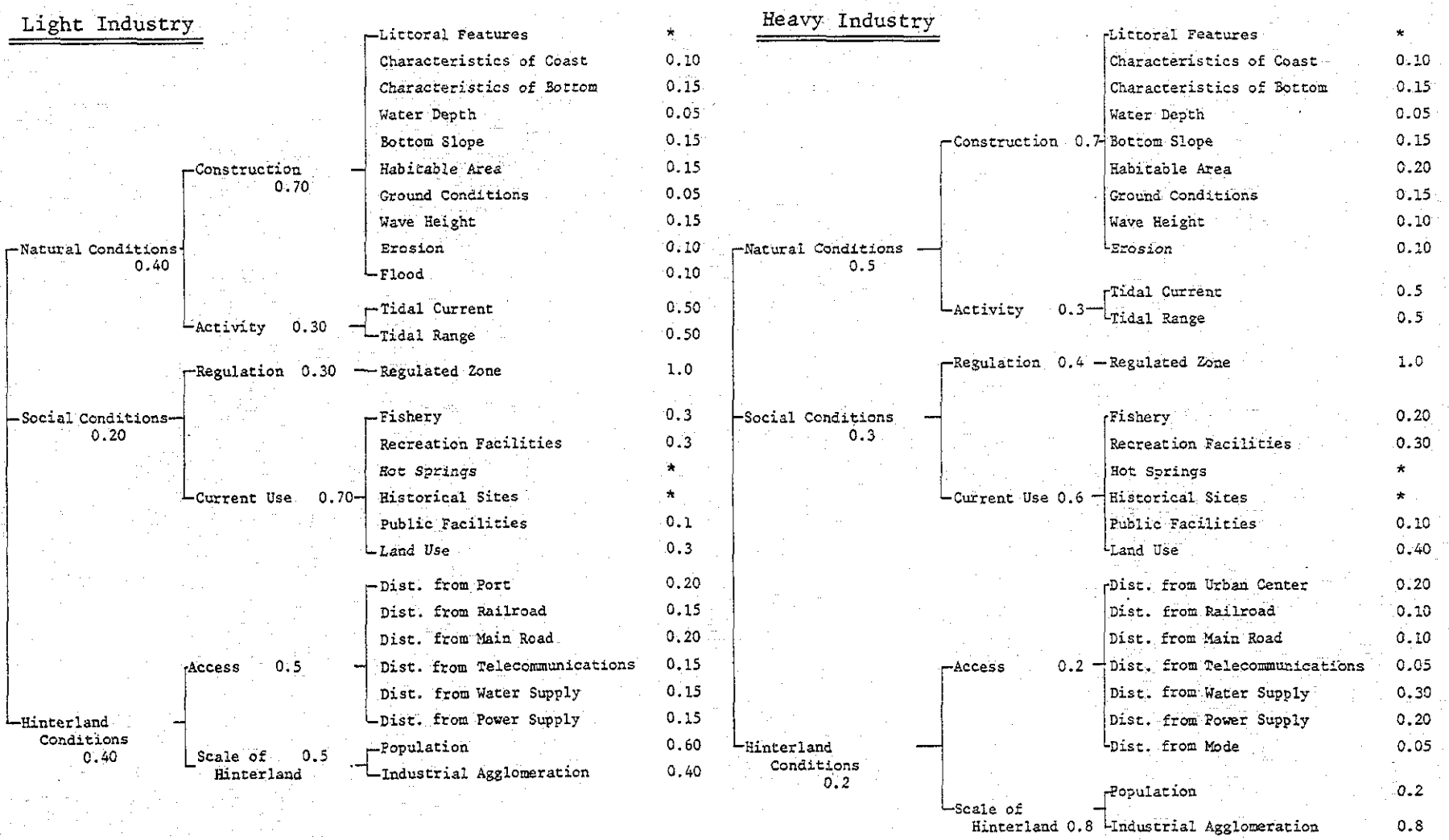


Fig. 1.1.1 (Continued)

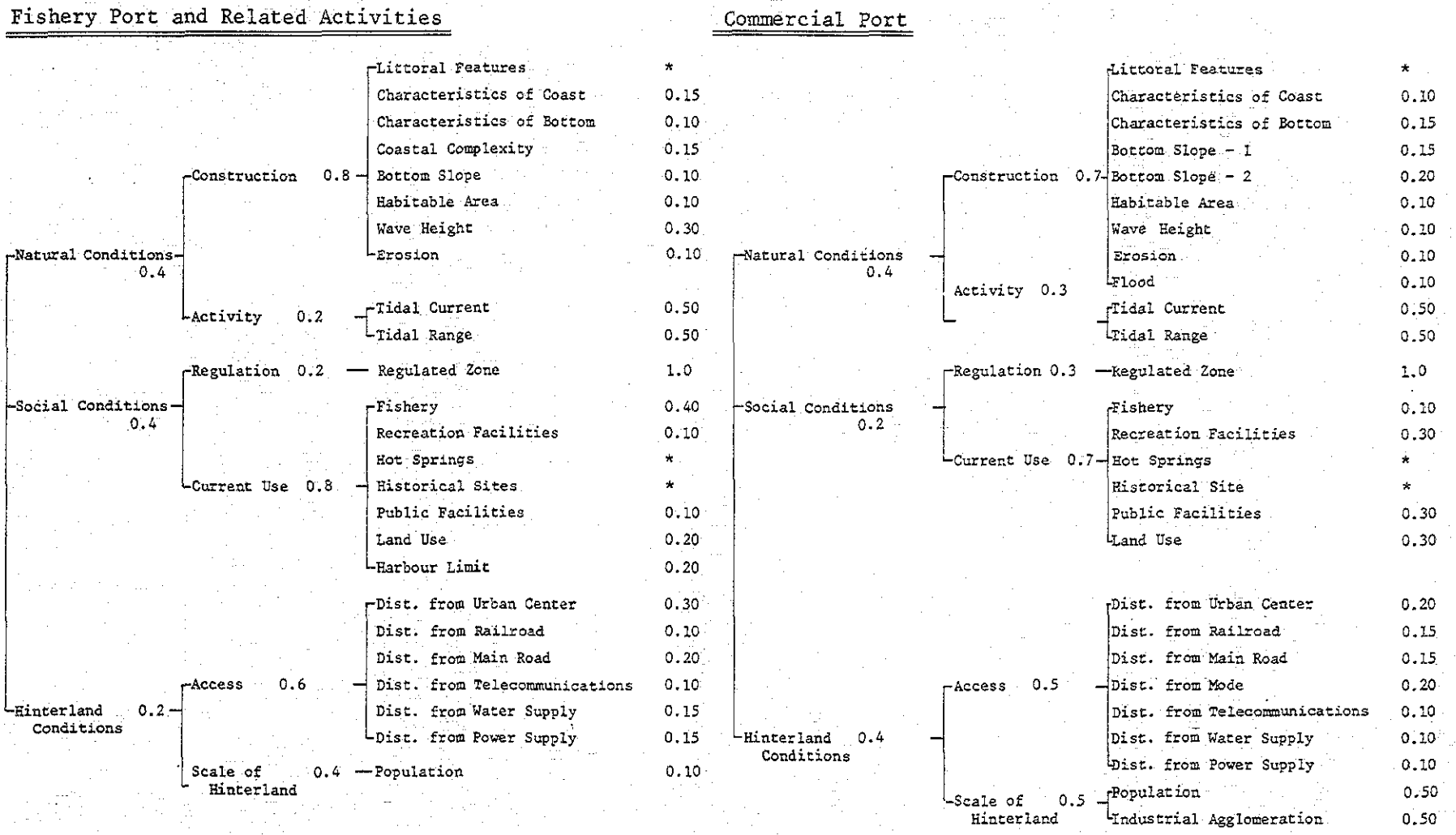


Fig. 1.1.1 (Continued)

Maritime Recreation and Tourism

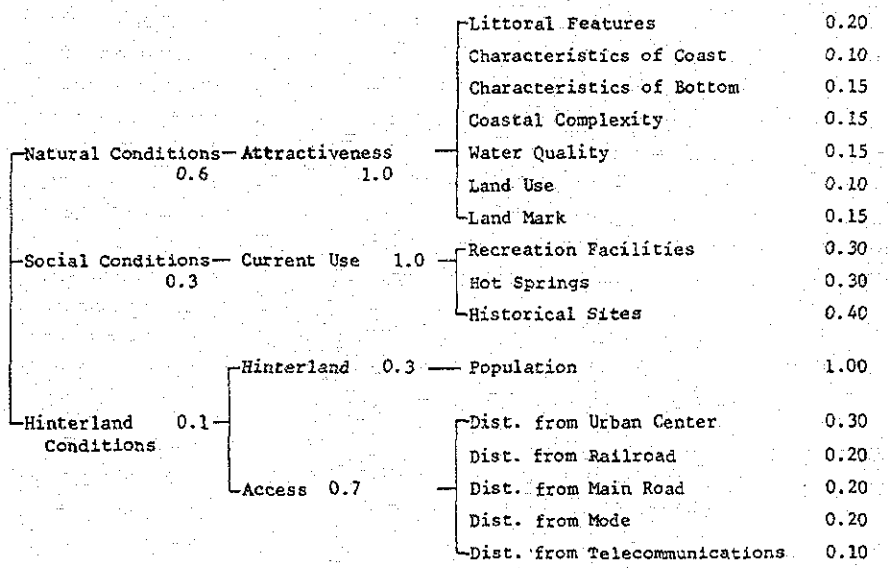


Table 1.1.1 Light Industry

Factors	Potential Rank									Remarks
	9	8	7	6	5	4	3	2	1	
Littoral Features										*Seaweed, Coral
Characteristics of Coast	Sand			Gravel			Rock			
Bottom	Sand			Silt		Gravel			Rock	
Water Depth	-2 >	-2--4.5	-4.5--7.0	-7.0~-9.5	-9.5~-12.0	-12.0~-14.5	-14.5--17	-17~-19.5	-19.5 <	m
Bottom Slope	4.0 <	3.5~4.0	3.0~3.5	2.5~3.0	2.0~2.5	1.5~2.0	1.0~1.5	0.5~1.0	0.5 >	km
Habitable Area	7.5 <	6.5~7.5	5.5~6.5	4.5~5.5	3.5~4.5	2.5~3.5	1.5~2.5	0.5~1.5	0.5 >	km
Ground Conditions	Good				Fare				Bad	
Wave Height	90	80~90	70~80	60~70	50~60	40~50	30~40	20~30	20 >	% of the height less than 1.0m
Erosion	No			Little Pile	Little Erosion		Pile		Erosion	
Flood	No				Probable				Risky	
Tidal Current	0.5 >	0.5~1.0	1.0~1.5	1.5~2.0	2.0~2.5	2.5~3.0	3.0~3.5	3.5~4	4 <	knots
Tidal Range	1 >	1~2.5	2.5~3	3~3.5	3.5~4	4~5	5~6	6~7	7 <	m
Regulated Area	20 <	20~15	15~10	10~8	8~6	6~5	5~4	4~3	3 >	km
Fishery	No Accumulation				Accumulated				Fairly Accumulated	
Recreation Facilities	No				Accumulated				Fairly Accumulated	
Hot Springs										*Existence
Historical Sites										*Existence
Public Facilities	Dense				Disperse				No	
Land Use	Vacant				Disperse				Dense	
Distance from Port	1 >	1~7	7~13	13~19	19~26	26~33	33~40	40~47	47 <	km
Distance from Railroad	1 >	1~8	3~15	15~22	22~29	29~36	36~43	43~50	50 <	km
Distance from Major Road	0.5 >	0.5~1.0	1.0~1.5	1.5~2.0	2.0~2.5	2.5~3.0	3.0~3.5	3.5~4.0	4.0 <	km
Distance from Telecom.	1.0 >	1~1.5	1.5~2.0	2.0~2.5	2.5~3.0	3.0~3.5	3.5~4.0	4.0~4.5	4.5 <	km
Distance from Water Supply	0.5 >	0.5~1.0	1.0~1.5	1.5~2.0	2.0~2.5	2.5~3.0	3.0~3.4	3.5~4.0	4.0 <	km
Distance from Power Station	1.0 >	1~6	6~11	11~16	16~21	21~26	26~31	31~36	36 <	km
Population	30 <	30~25	25~20	20~15	15~10	10~5	5~3	3~2	2 >	10^4 persons
Industrial Agglomeration	Dense				Disperse				No	

Table 1.1.2 Heavy Industry

Factors	Potential Rank 9	8	7	6	5	4	3	2	1	Remarks
Littoral Features										*Seaweed, Coral
Characteristics of Coast	Sand			Gravel			Rock			
Bottom	Sand			Silt		Gravel			Rock	
Water Depth	-2 >	-2~4.5	-4.5~-7.0	-7.0~-9.5	-9.5~-12.0	-12.0~-14.5	-14.5~-17.0	-17.0~-19.5	-19.5 <	m
Bottom Slope	0.5 >	0.5-1.0	1.0-1.5	1.5-2.0	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0	4.0 <	km
Habitable Area	7.5 <	6.5-7.5	5.5-6.5	4.5-5.5	3.5-4.5	2.5-3.5	1.5-2.5	0.5-1.5	0.5 >	km
Ground Conditions	Good				Fare				Bad	
Wave Height	90	80-90	70-80	60-70	50-60	40-50	30-40	20-30	20 >	%
Erosion	No			Little Pile	Slightly Errode		Pile		Erroded	
Tidal Current	<0.5	0.5-1	1-1.5	1.5-2	2-2.5	2.5-3	3-3.5	3.5-4	4 <	Knots
Tidal Range	<1	1-2.5	2.5-3.0	3.0-3.5	3.5-4.0	4.0-5.0	5.0-6.0	6.0-7.0	7.0 <	m
Regulated Area	20 <	20-15	15-10	10-8	8-6	6-5	5-4	4-3	3 >	km
Fishery	No				Accumulated				Fairly Accumulated	
Recreation Facilities	No				Accumulated				Fairly Accumulated	
Hot Springs										*Existence
Historical Sites										*Existence
Public Facilities	Dense				Disperse				No	
Land Use	Vacant				Disperse				Dense	
Distance from Urban Center	1 >	1-5	5-10	10-30	30-50	50-70	70-90	90-100	100 <	km
Distance from Railroad	1 >	1-5	5-10	10-15	15-20	20-30	30-40	40-50	50 <	km
Dist. from Major Road	1 >	1-5	5-10	10-15	15-20	20-30	30-40	40-50	50 <	km
Dist. from Telecommunications	1 >	1-1.5	1.5-2	2-2.5	2.5-3	3-3.5	3.5-4	4-4.5	4.5 <	km
Dist. from Water Supply	1 >	1-5	5-10	10-15	15-20	20-30	30-40	40-50	50 <	km
Dist. from Power Station	1 >	1-6	6-11	11-16	16-21	21-26	26-31	31-36	36 <	km
Dist. from Mode	1 >	1-6.5	6.5-12	12-17.5	17.5-23	23-28.5	28.5-34	34-39.5	39.5<	km
Population	30 <	30-25	25-20	20-15	15-10	10-5	5-3	3-2	2 >	10^4 persons
Industrial Agglomeration	Dense				Dense				No	

Table 1.2.3 Fishery Port & Related Activity

Factors	Potential Rank									Remarks
	9	8	7	6	5	4	3	2	1	
Littoral Features										*Seaweed, Coral
Characteristics of Coast	Sand			Grabel			Rock			
Bottom	Sand			Silt		Gravel			Rock	
Coastal Complexity	Monotonous			Rather Monotonous			Rather Complicated		Complicated	
Bottom Slope	0.5 >	0.5~1.0	1.0~1.5	1.5~2.0	2.0~2.5	2.5~3.0	3.0~3.5	3.5~4.0	4.0 <	Distance to -10m (km)
Habitable Area	7.5 <	6.5~7.5	5.5~6.5	4.5~5.5	3.5~4.5	2.5~3.5	1.5~2.5	0.5~1.5	0.5 >	Distance to 100m (km)
Wave Height	90	80~90	70~80	60~70	50~60	40~50	30~40	20~30	20 >	% of the height lower than 1m
Erosion	No			Little Pile	Little Errode		Pile		Eroode	
Tidal Current	<0.5	0.5~1	1~1.5	1.5~2	2~2.5	2.5~3	3~3.5	3.5~4	4 <	knot
Tidal Range	<1	1~2.5	2.5~3	3~3.5	3.5~4	4~5	5~6	6~7	7 <	Hight Difference (m)
Regulated Area	20 <	20~15	15~10	10~8	8~6	6~5	5~4	4~3	3 >	Distance to Regulated Zone (km)
Fishery	Ferely Accumulated				Accumulated				No Accumulation	
Recreation Facilities	No Accumulation				Accumulated				Fairly Accumulated	
Hot Springs										* Existence
Historical Sites										* Existence
Public Facilities	Densely Accumulated				Dispersely Accumulated				No Accumulation	
Land Use	Vacant				Disperse				Dense	
Harbour Limit	No				Exist					
Distance from Urban Center	1 >	1~7	7~13	13~19	19~26	26~33	33~40	40~47	47 <	km
Distance from Railroad	1 >	1~8	8~15	15~22	22~29	29~36	36~43	43~50	50 <	km
Distance from Major Road	0.5 >	0.5~1.0	1.0~1.5	1.5~2.0	2.0~2.5	2.5~3.0	3.0~3.5	3.5~4.0	4.0<	km
Distance from Telecommunications	1 >	1~1.5	1.5~2.0	2.0~2.5	2.5~3.0	3.0~3.5	3.5~4.0	4.0~4.5	4.5<	km
Distance from Water Supply	0.5>	0.5~1.0	1.0~1.5	1.5~2.0	2.0~2.5	2.5~3.0	3.0~3.5	3.5~4.0	4.0<	km
Distance from Power Station	1.0>	1~6	6~11	11~16	16~21	21~26	26~31	31~36	36 <	km
Population	30 <	30~25	25~20	20~15	15~10	10~5	5~3	3~2	2 >	10^4 persons

Table 1.2.4 Commercial Port

Factors	Potential Rank									Remarks
	9	8	7	6	5	4	3	2	1	
Littoral Features										Seaweed
Characteristics of Coast	Sand				Gravel				Rock	
Characteristics of Bottom	Sand			Silt		Gravel			Rock	
Bottom Slope 1	1 >	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8 <	
Bottom Slope 2	0.5 >	0.5-1.0	1.0-1.5	1.5-2.0	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0	4.0 <	
Habitable Area	7.5 <	6.5-7.5	5.5-6.5	4.5-5.5	3.5-4.5	2.5-3.5	1.5-2.5	0.5-1.5	0.5 >	
Wave Height	90	80-90	70-80	60-70	50-60	40-50	30-40	20-30	20 >	
Erosion	No			Little	Little					
Flood	No			Pile	Errode Possible		Pile		Errosion Risky	
Tidal Current	<0.5	0.5-1	1-1.5	1.5-2	2-2.5	2.5-3	3-3.5	3.5-4	4 <	
Tidal Range	<1	1-2.5	2.5-3	3-3.5	3.5-4	4-5	5-6	6-7	7 <	
Regulated Area	20 <	20-15	15-10	10-8	8-6	6-5	5-4	4-3	3 >	
Fishery	No				F.A.				A	
Recreation Facility	No				F.A.				A	
Hot Springs										Exist *
Historical Sites										Exist *
Public Facility	Dense				Disperse				No	
Land Use	Vacant				Disperse				Dense	
Dist. from U.C.	1 >	1-7	7-13	13-19	19-26	26-33	33-40	40-47	47 <	
Dist. from R.R.	1 >	1-8	8-15	15-22	22-29	29-36	36-43	43-50	50 <	
Dist. from M.R.	0.5 >	0.5-1.0	1.0-1.5	1.5-2.0	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0	4.0<	
Dist. from Mode	1.0 >	1-6.5	6.5-12	12-17.5	17.5-23	23-28.5	28.5-34	34-39.5	39.5 <	
Dist. from T.C.	1 >	1-1.5	1.5-2	2-2.5	2.5-3	3-3.5	3.5-4	4-4.5	4.5 <	
Dist. from W.C.	0.5 >	0.5-1.0	1.0-1.5	1.5-2.0	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0	4.0 <	
Dist. from P.S.	1.0 >	1-6	6-11	11-16	16-21	21-26	26-31	31-36	36 <	
Population	30 <	30-25	25-20	20-15	15-10	10-5	5-3	3-2	2 > 0	
Industry	Dense				Disperse				No	

Table 1.1.5 Maritime Recreation and Tourism

Factors	Potential Rank									Remarks
	9	8	7	6	5	4	3	2	1	
Littoral Features	Seaweed								No	
Characteristics of Coast	Sand				Gravel				Rock	
Characteristics of Bottom	Sand			Gravel		Rock			Silt	
Coastal Complexity	Complex			Rather Complex	Rather Monotonous		Monoto-nous			
Water Quality	Good				Rather Good				Bad	
Land Use	Vacant				Disperse				Dense	
Land Mark	A				F.A.				N	
Recreation Facility	A.				F.A.				N	
Hot Springs	A								N	
Historical Sites	A								N	
Population	30 <	30-25	25-20	20-15	15-10	10-5	5-3	3-2	2 >	
Dist. from U.C.	1 >	1-7	7-13	13-19	19-26	26-33	33-40	40-47	47 <	
Dist. from R.R.	1 >	1-8	8-15	15-22	22-29	29-36	36-43	43-50	50 <	
Dist. from M.R.	0.5 >	0.5-1.0	1-1.5	1.5-2.0	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0	4.0<	
Dist. from Mode	1.0 >	1-6.5	6.5-12	12-17.5	17.5-23	23-28.5	28.5-34	34-39.5	39.5 <	
Dist. from T.C.	1 >	1-1.5	1.5-2	2-2.5	2.5-3	3-3.5	3.5-4	4-4.5	4.5 <	

Fig. 1.1.2 Total Potential

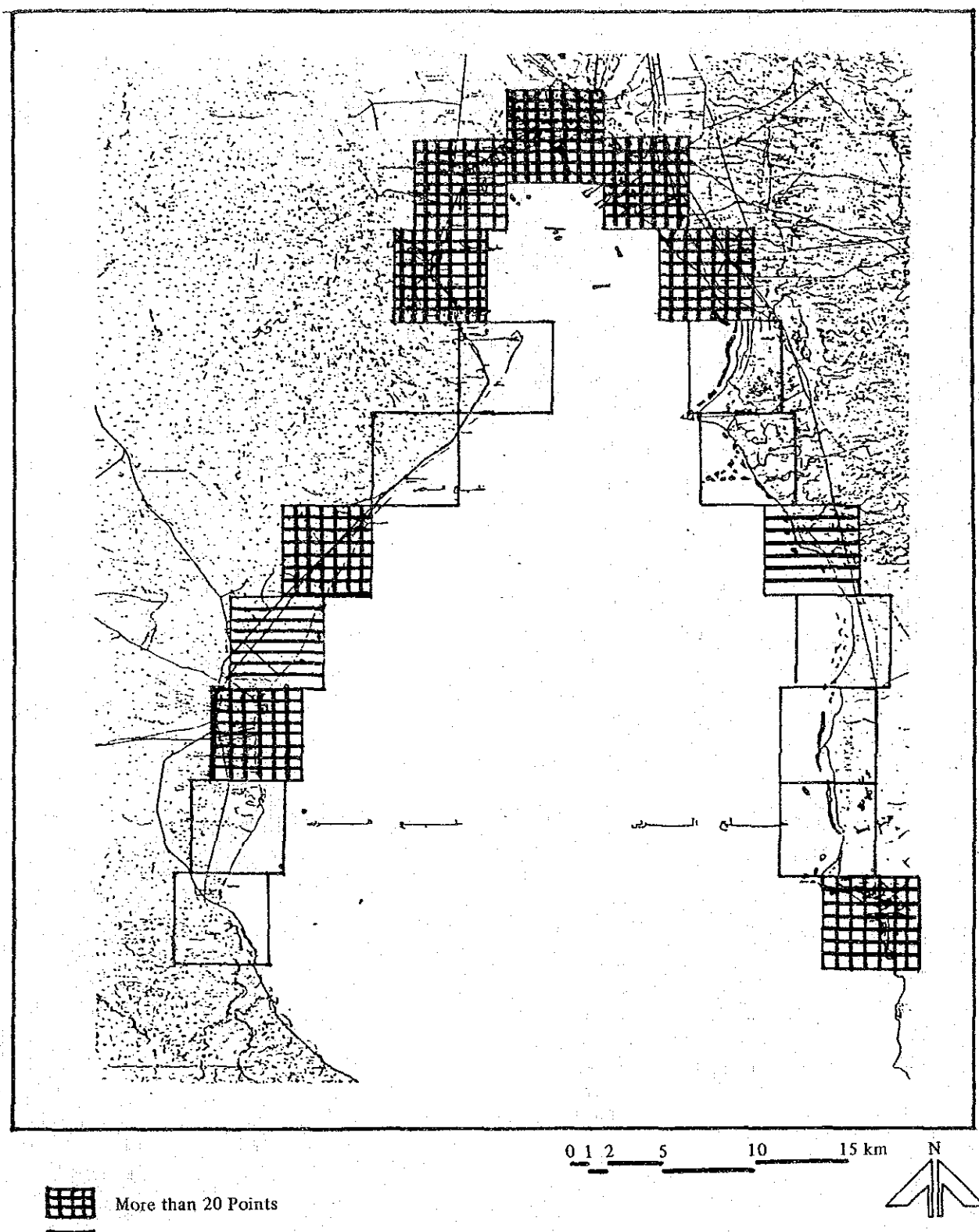


Fig. 1.1.3 Assessment of Potential: Light Industry

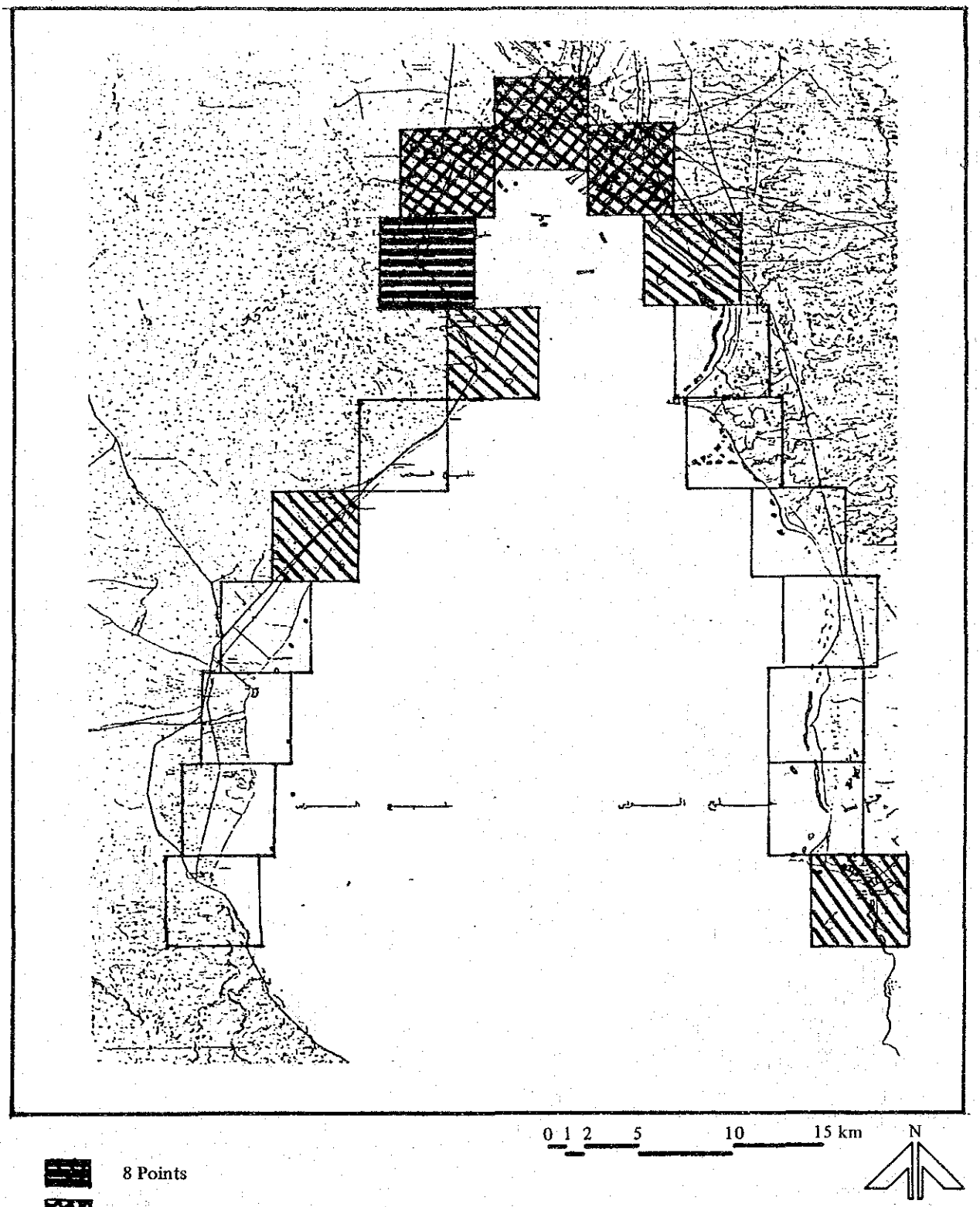


Fig. 1.1.4 Assessment of Potential: Heavy Industry

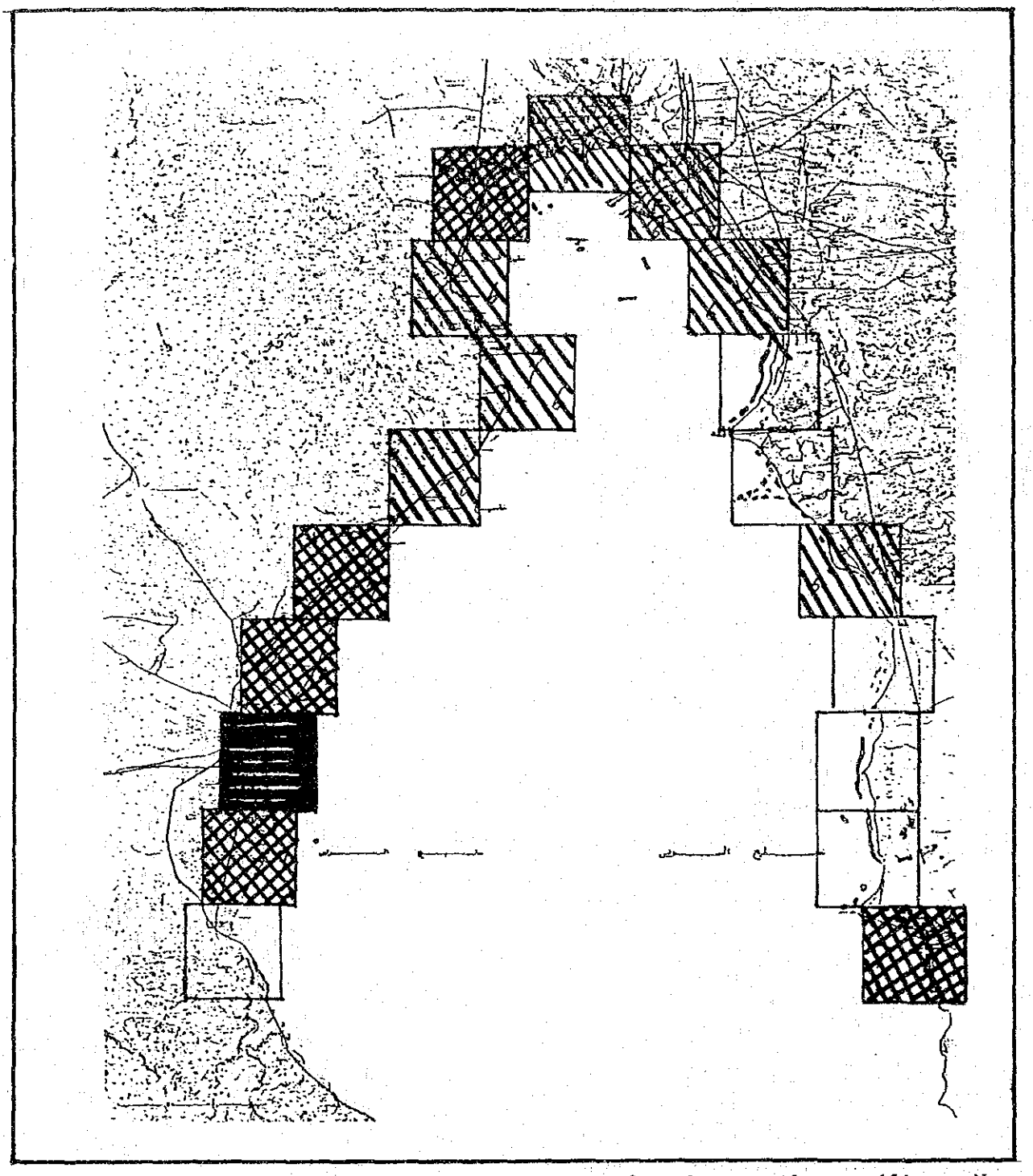


Fig. 1.1.5 Assessment of Potential: Fishery Port & Related Activities

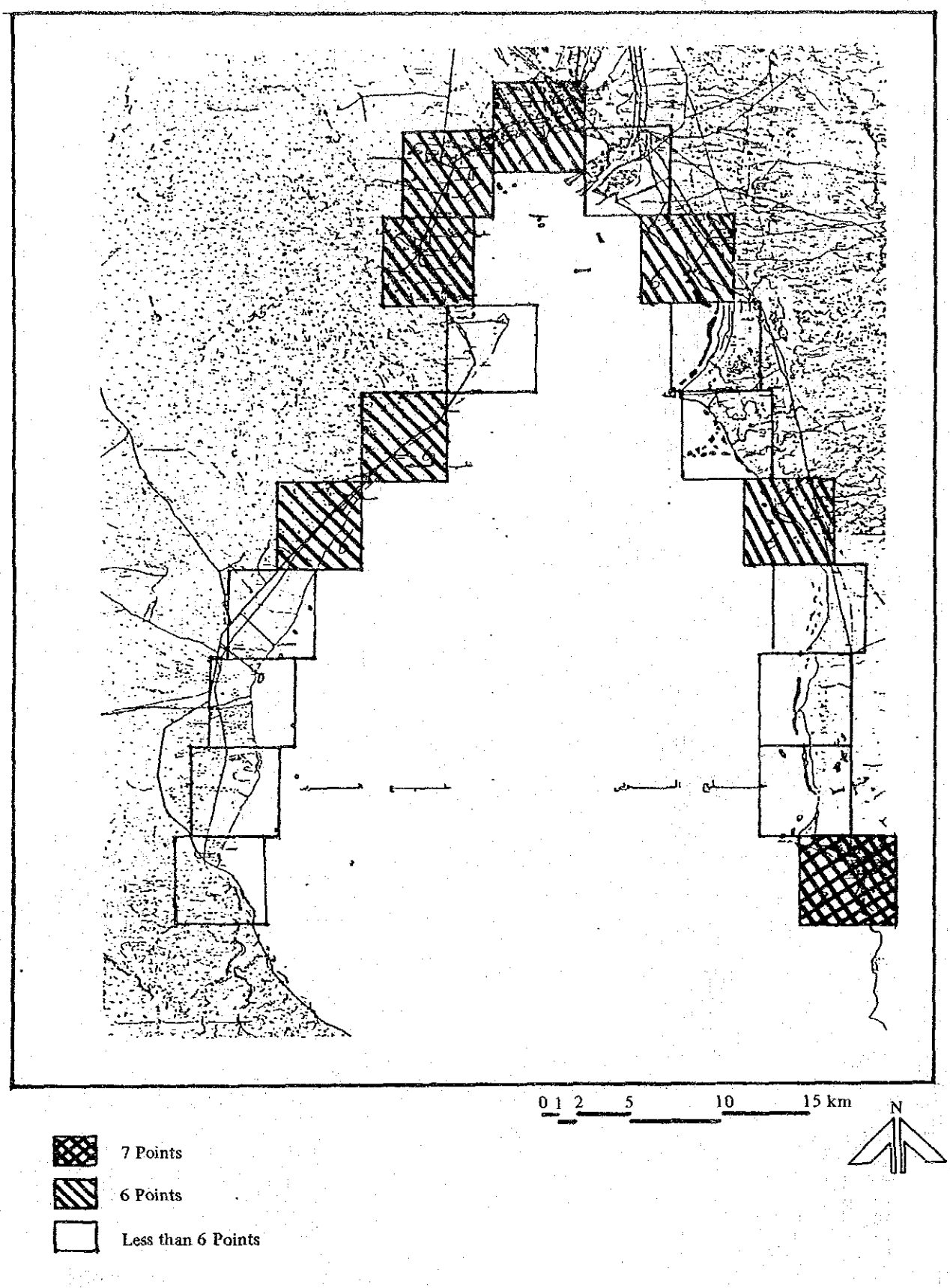


Fig. 1.1.6 Assessment of Potential: Commercial Port

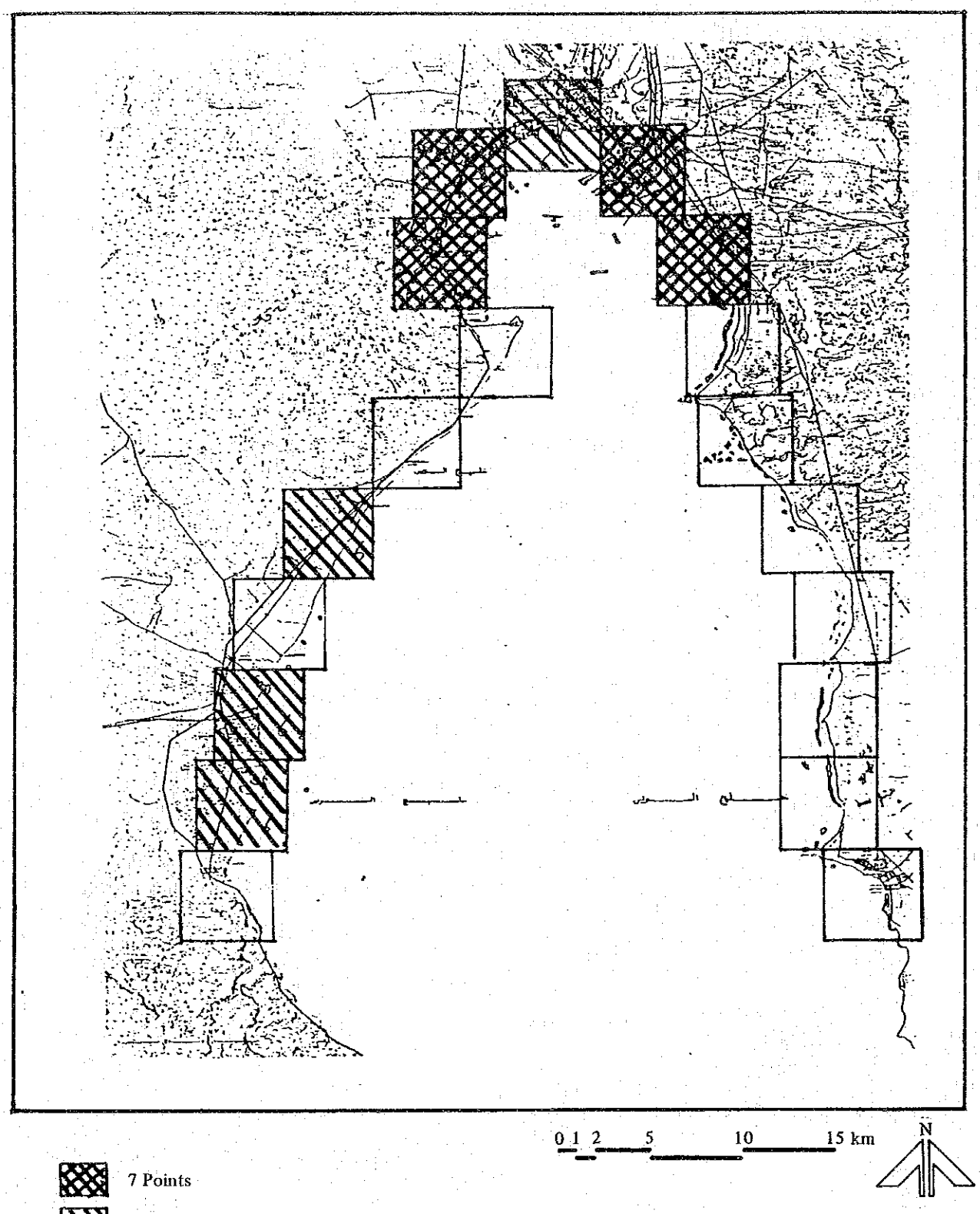
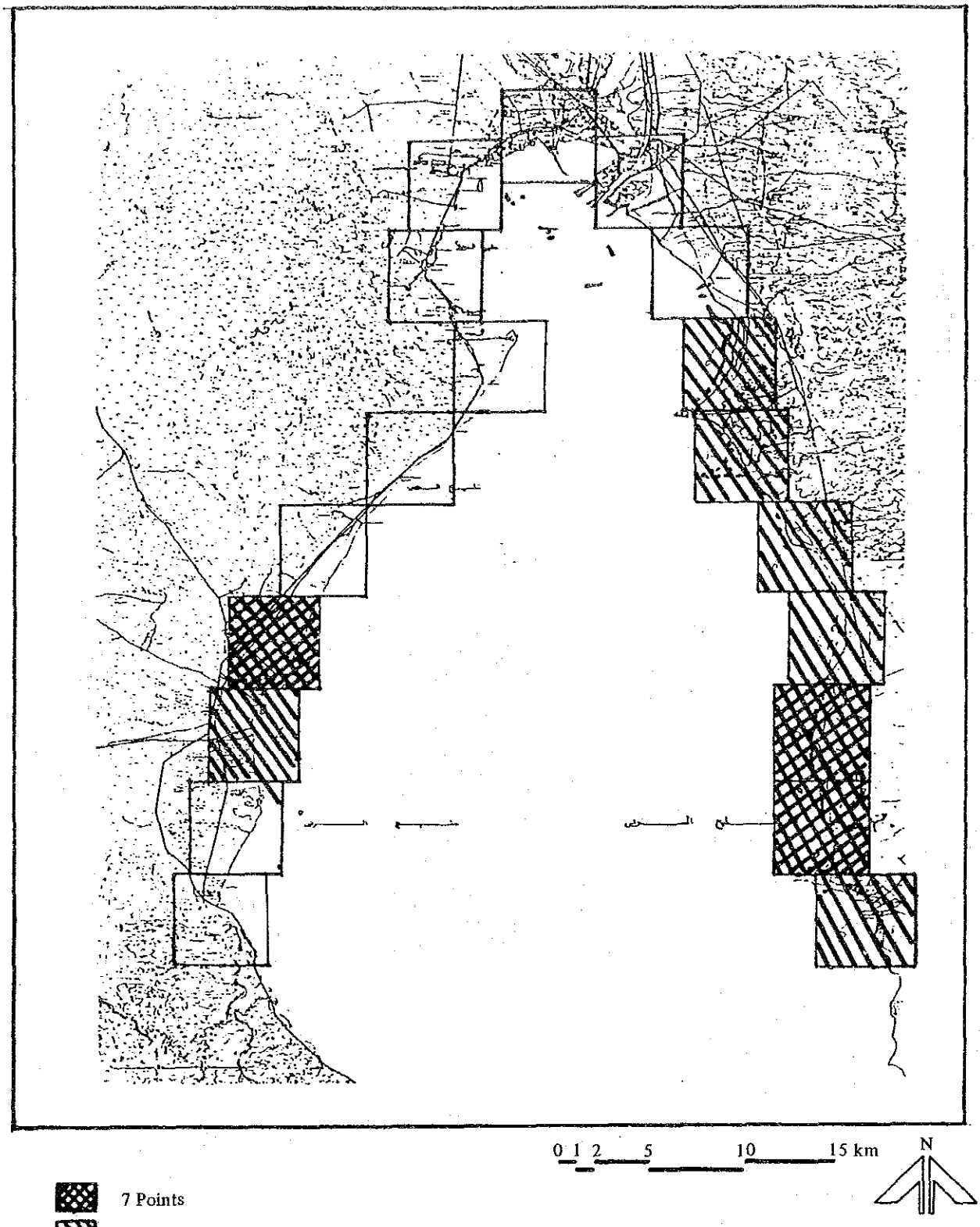


Fig. 1.1.7 Assessment of Potential: Maritime Recreation and Tourism



APPENDIX II

— Industry —

1. Industrial Zones in the New Communities
2. Establishment of Export Processing Zone Facilities in the World
3. Strategic Industrial Sectors in the Five Year Plan
4. Growing Industries in 1977/82
5. Export Oriented Industries
6. Import Substitution Industries
7. Urban Industries for Decentralization
8. Mineral Resources Consuming Industries
9. Areas of Investment for the Private Sector
10. Vocational Training Center in Suez
11. Density of Workers per Hectare
12. Trend of Recycled Industrial Water in Japan
13. Outline of Industrial Waste Water Treatment Process
14. Environmental Pollution Control in Japan

2.1 Industrial Zones in the New Communities

Name of New Town	Phase	Total Area of Industrial Zones	Progress of Construction			Major Types of Industries Developed
			Area Specified	Area Specified for Immediate Future	For Future	
EL-Asher men Ramaden	I	910.5	567.2	224.5	118.8	Medium Ind., Carpet
	II	175.0			175.0	Woodworking,
	III	175.0			175.0	Glass, Plastics
	IV	175.0			175.0	Woven Material
	Total	1,435.5			643.8	
EL-Sadat	I	100.0	180.0	50.0		Medium and Light Ind.
	II	230.0			306.6	Medium and Light Ind.
	III	1,470.0			949.2	Heavy Industries: Iron and Steel, Petro-chemicals
	Total	1,800.0				
Sixth October	I	200.0	180.0	20.0		Meduim Industries: Engineering Fabrics
	II	200.0			200.0	Light Industries: Foodstuffs
	III	300.0			300.0	Light and Medium Industries
	Total	700.0				
EL-Amereya	I	110.0	98.6		11.4	Medium and Small Ind. (Separated)
EL-Gadeeda	II	256.0			256.0	Medium and Small Ind. (Separated) Cottage Industry and Services
	III	951.0			951.0	Heavy: Chemicals, Fertilizer and Manure
	Total	1,317.0				
EL-Salhayia	I	138.5	113.5	25.0		Agricultural Industries: Fodder, Milk, etc.
EL-Gadeeda	II	138.5			138.5	
	Total	277.0				
Domietta	I	18.0			18.0	Medium: Maintenance of Agricultural Machines, Cars, Welding Workshop, and Moulding
EL-Gadeeda	II	38.0			38.0	
	III	50.0			50.0	
	IV	60.0			60.0	
	Total	166.0				

2.1 (Continued)

Name of New Town	Phase	Total Area of Industrial Zones	Progress of Construction			Major Type of Industries Developed
			Area Specified	Area Specified for Immediate Future	For Future	
Badr	I	150.0			150.0	Medium and Light Ind. Storage of Food
	II	100.0			100.0	
	II	100.0			100.0	Agricultural Machinery
	III	89.0			89.0	
	Total	339.0				
EL-Aboor	I	175.0			175.0	Medium and Light
	II	140.0			140.0	Chemical Industries, Foodstuffs and Professional
	III	45.0			45.0	
	Total	360.0				
EL-Amal	I	100.0			100.0	Heavy: Chemical Industries
	II	100.0			100.0	Building Materials
	III	165.0			165.0	Clothes, Furniture, Foodstuffs, and Light Industry
	Total	365.0				
Shata EL-Gadeeda Area (Domietta City)	I	6.7			6.7	Medium: Wood Products
	II	6.7			6.7	Milk Products, Leather Products, Glass and Mirrors
	Total	13.4				
EL-Menya	I	55.0			55.0	Heavy: Chemicals and Building Materials
EL-Gadeeda	II	30.0			30.0	Medium: Woven Material, Furniture, and Foodstuffs
	III	37.0			37.0	Light: Services and Professional
	Total	122.0				
Bani-Suife	I	60.0			60.0	Heavy: Building Materials
	II	30.0			30.0	Medium: Foodstuffs, Woven Material
	III	40.0			40.0	Light: Services and Professional
	Total	130.0				

2.1 (Continued)

Name of New Town	Phase	Total Area of Industrial Zones	Progress of Construction			Major Type of Industries Developed
			Area Specified	Area Specified for Immediate Future	For Future	
Asyoot	I	20.0			20.0	Heavy:
EL-Gadeeda (Shams)	II	20.0			20.0	Building Materials
	III	20.0			20.0	Medium: Foodstuffs, Woven Materials, Furniture, Animals and Agricultural
	Total	60.0				

2.2 Establishment of Export Processing Zone Facilities in the World

	1960 ~ 64	1965 ~ 69	1970 ~ 74	1975 ~ 79	1980 ~ 83	Total	Names of Zones/ Year of Establishment
CARIBBEAN (Totals)		1	4	1		6	
Barbados			near zone facilities				Various Sites
Dominican Republic		1	2			3	In Romana 1969, San Pedro de Macoris
Haiti			1			1	*Port au Prince* 1974
Jamaica				1		1	Port of Kingston 1978
CENTRAL AMERICA (Totals)		2	2	2	2	8	
Costa Rica					2	2	Puerto Limon, Calderas
El Salvador			1			1	San Bartalo 1974
Guatemala			1			1	San Tomas de Castillo 1972
Honduras				1		1	Puerto Cortes 1978
Mexico		various sites				1	Various Sites
Nicaragua				1		1	La Mercedes 1976
Panama		1				1	Colon 1969

2.2 (Continued)

	1960 ~ 64	1965 ~ 69	1970 ~ 74	1975 ~ 79	1980 ~ 83	Total	Names of Zones/ Year of Establishment
ASIA (Totals)	1	4	12	6	12	35	
Bangaladesh					1	1	Chittagong
China					4	4	Shenzen, Shubai, Shantou, Xiamen
Hong Kong	near zone conditions					1	Various Sites
India		1	1			2	Kandla 1966, Santa Cruz 1971
Indonesia				2	1	3	Jakarta, Surabaya, Batam Island
Malaysia			8	2		10	Malacca: Batu Berendam, Tanjong Kling Penang: Pulan Terak, Prai, Prai Wharves Johore: Senai Selangor: Sungai Way, Subang, Ampang, Ulu Klang, Telok Panglina, Garang
Pakistan					1	1	Karachi
Philippines		1			4	5	Bataan 1966, Mactan, Banguco, Batangas, Isabel (Leyte)
Republic of Korea			1	1		2	Mason 1971, Iri 1975
Singapore		near zone conditions				1	Various Sites
Sri Lanka				1		1	Katunyaki 1978
Taiwan		1	2			3	Kaosiung 1966, Nantze 1970, Taichung 1971
Thailand					1	1	Lat Krabang, 1982
MIDDLE EAST AND MEDITERRANEAN (Totals)				8	1	9	
Cyprus					1	1	Larnaca 1982
Egypt				4		4	Alexandria, El Nasr Cairo, Port Said, Suez, Plus Private Zones
Jordan				1		1	Aqaba
Syria				3		3	Aleppo, Lattaka, Tartous
AFRICA AND INDIAN OCEAN (Totals)		1	2	2		5	
Liberia				1		1	Monrovia 1976
Mauritius		available throughout island				1	Various Sites since 1971
Senegal				1		1	Dakar 1976
Tunisia			2			2	Megrine, Ben Arous

2.2 (Continued)

	1960 ~ 64	1965 ~ 69	1970 ~ 74	1975 ~ 79	1980 ~ 83	Total	Names of Zones/ Year of Establishment
SOUTH AMERICA (Totals)		1	3	1	1	6	
Brazil		1				1	Manaus 1968
Chile				1		1	Iquique 1978
Colombia			3		1	4	Barranquilla 1971, Buenaventura 1973, Palmasca 1974, Cartagena 1982
OCEANIA (Totals)				1		1	
Western Samoa				1		1	Samoa 1977
Grand Total	1	9	23	21	16	70	

2.3 Stragetic Industrial Sectors in the Five Year Plan

Sector	Industries/Goods	
High Growth	◎ Sugar	(Food)
	• Textile Mill Products	(Textiles)
	• Clothing (Ready Made)	(Apparel)
	• Cement	(Nonmetallic Products)
	• Bricks	(Nonmetallic Products)
	• Steel Reinforcing Bars	(Iron and Steel)
	• Foddstuffs	(Food)
	• Pharmaceuticals	(Chemicals)
	• Vehicles	(Transportation Equipment)
Promoting Private Investment in the Industrial Sector	• Biomass from Industrial Wastes	(Chemicals)
	• Insecticide	(Chemicals)
	• Foodstuffs (Fermentationo (Fermentation of Waste)	(Food)
	• Light Machines & Equipment	(Machinery)
	• Fishing Boat	(Transportation Equipment)
	• Packing Material	(Paper Products)
	• Clothing (Ready Made)	(Apparel)
	• Furniture	(Furniture)
	• Glass Containers	(Nonmetallic Products)
	• Special Glass	(Nonmetallic Products)
	• Glass Fiber	(Nonmetallic Products)
	• Clay Refractories	(Nonmetallic Products)
	• Brick Substitute	(Nonmetallic Products)
	• Abrasives for Construction	(Nonmetallic Products)
	• Maintenance for Electric Equipment for Industrial Production Control	(Services)
	• Light Machinery	(Metal, General Machinery)
	• Solar Equipment	(Machinery)

2.3 (Continued)

Sector	Industries/Goods
Strategic Industries	○ Inducing Investment from other Sectors ・ Cement (Nonmetallic Products) ・ Round Bars (Iron and Steel) ・ Bricks (Nonmetallic Products) ・ Gypsum (Nonmetallic Products) ・ Glass (Nonmetallic Products) ・ Steel Pipe (Iron and Steel)
	○ For Domestic Consumption ・ Foodstuffs (Food) ・ Apparel (Textiles)
	○ Export Industries ・ Cement (Nonmetallic Products) ・ Gypsum (Nonmetallic Products) ・ Fertilizer (Chemicals) ・ Handicrafts ・ Clothing (Ready Made) (Apparel)
	○ Use of Idle Facilities ・ Iron of Idle Facilities (Iron and Steel) ・ Sugar (Food)
	○ Capital Goods Relating to the Development of Engineering Industries ・ Tractors (Transportation Equipment) ・ Pumps (General Machinery) ・ Reapers (General Machinery) ・ Trucks (Transportation Equipment) ・ Automatic Baking Machines (Parts) (Electric Machinery)
Main Projects in the Manufactu: turing Sector	・ Sugar ..... Gilga Sugar Factory ・ Tabacco ..... Eastern Tobacco Co. ・ Textiles ..... El Araria Textile Co. ・ Textiles ..... Misr Helwan Textile Co. ・ Apparel ..... Clothing and Blanket Project

2.4 Growing Industries in 1977/82

Industries	Goods
Food	Soft Drinks, Tobacco
Textiles	Synthetic Fibers
Chemicals	Glycerin, Calcium Nitrate, Rubber Products, Drugs & Medicines, Toiletries
Metal Products	Billets, Casting Products, Wire Mesh Cable
Electric Machinery	Air Conditioners, Refrigerators, Electric Bulbs, Heaters, Televisions, Electric Measuring Instruments
Nonmetallic Products	Pottery Products, Brick

Note: Except Crude Oil, Iron and Engineering Industries.

2.5 Export Oriented Industries

- Beverages (Fruit Base)
- Cotton Yarn
- Woven Fabric
- White Shirts and Underwear
- Furniture
- Toiletries
- Leather Products
- Aluminium Ingot
- Rolled Aluminium

2.6 Import Substitution Industries

- Meat Products
- Dairy Products
- Wheat Flour
- Animal and Vegetable Oil and Fat
- Paper
- Industrial Inorganic Chemicals
- Chemical Fertilizer
- Cyclic Intermediate Goods
- Drugs and Medicines
- Cement
- Iron and Steel
- Tractors
- General Industrial Machinery and Equipment
- Pumps
- Compressors
- Power Generators
- Power and Distribution Transformers
- Household Electric Appliances
- Motor Vehicles and Related Equipment
- Ship Building

2.7 Urban Industries for Decentralization

1. Food	• Flour • *Balanced Feeds Compound* • Edible Oils and Fats • Meat Products • Frozen Food Products
2. Housing Related Industries	• Sawn Lumber • Plywood • Fibre Board
3. Construction Related Industries	• Cement • Concrete • Secondary Concrete Products • Secondary Steel Products • Steel Structures • Aluminium
4. Pollution Prevention Industries	

2.8 Mineral Resources Consuming Industries

Resources	Main Consuming Industries
Dolomite Stone	Iron and Steel, Glass, Lime, Claycal, Construction Materials
Limestone	Cement, Iron and Steel, Lime, Soda-glass, Construction Materials
White Sand	Glass
Marble Stone	Masonry
Gypsum	Cement Board, Plaster
Manganese	Iron and Steel, Electrolysis
Kaolin	Paper Mills
Phosphate	Phosphoric Acid, Fertilizer
Zinc	Galvanized Steel Sheets, Zinc Diecast
Fluorspar	Iron and Steel, Aluminium Products
Graphite	Black Lead, Electrodes
Baryta	Barium Base, Oil Seal

2.9 Areas of Investment for the Private Sector

- Ready Made Garments
- Milk Production
- Dairy Products
- Edible Oil Extraction
- Tomato Paste Production (Preferably as an Agroindustrial Project)
- Food Industries Based on Local Raw Materials
- Electrical Bulbs, Fittings and Switches
- All Kinds of Electrical Accessories
- Paper Pulp, Writing and Printing Paper Using Local Agricultural Residues
- Fodder Production Using Local Residues
- Exploitation of Local Salines for Producing Salt and Essential Chemicals
- Detergents
- Construction and Building Materials Except Ceramic Products:
  - Bricks
  - Cement
  - Gypsum
  - Steel Bars for Reinforcement
  - Flat Glass
  - Woodworking Tools
  - Sanitary Wares and Fittings
  - Paints & Chemicals for Buildings
  - Marble Sheets and Floor Coverings
  - Solar Heaters
  - Concrete Poles
- Electrical Components & Compressors for Refrigerators
- Standard Furniture for Schools and Offices
- Mineral Wealth Exploration and Production of Essential Raw Materials for Agriculture and Industry
- Modern Sewing Machines
- Knitwear Machines (Assembly and Manufacture)
- Calculators (Assembly and Manufacture)
- Packing Materials
- Handcrift Articles Using Local Raw Materials

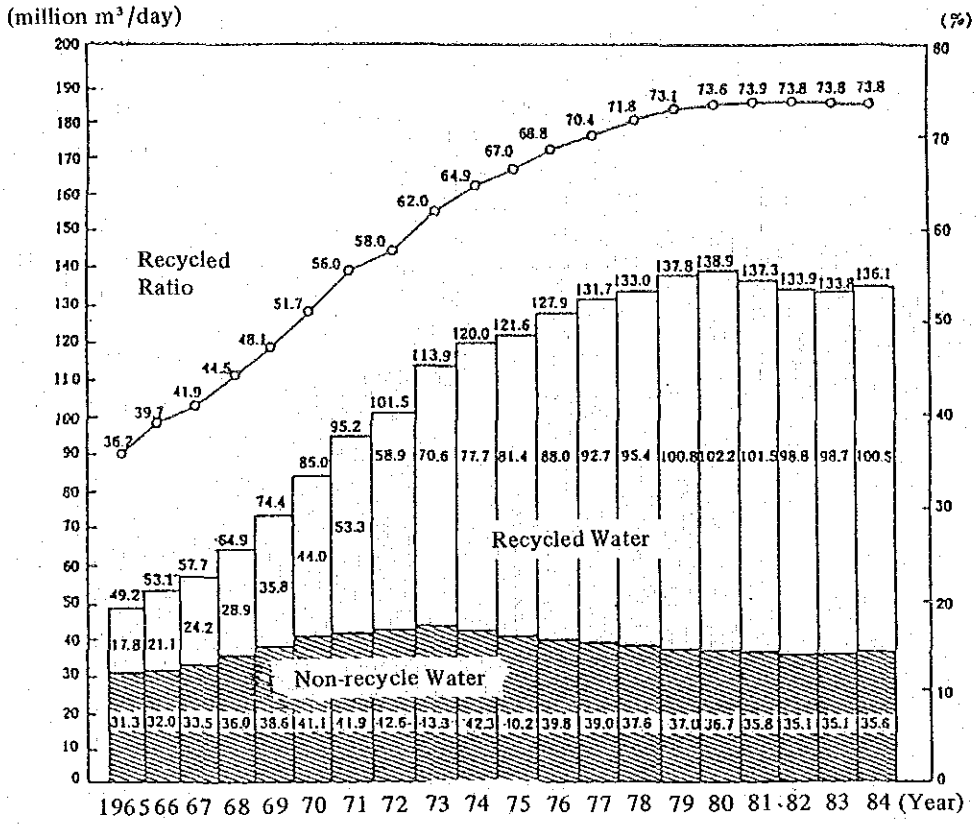
2.10 Vocational Training Centre in Suez

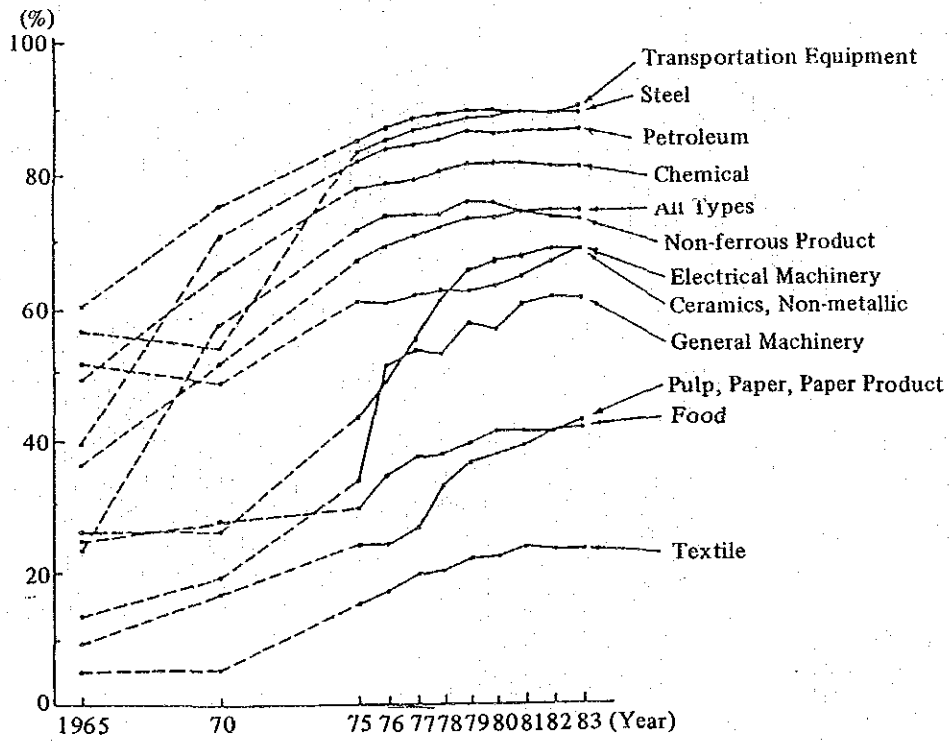
Specification	Capacity/Shift
Metal Trades Training	Persons
Mechanical Assembly Fitter	30
Tool and Dies Fitter	15
Pipe Fitter	20
Industrial Mechanical Equipment Repairman	15
Turner	15
Machinist	15
General Wleder	20
Sheet Metal & Plumber	20
Ventilation, Air Conditioning & Refrigeration	20
Sub Total	170
Electrical Trades Training	
Pneumatic & Electronic Equipment Repairman	20
Electrical & Thermal Control Instrument Repairman	15
Electrician General	25
Industrial Electrical Equipment Repairman	20
Sub Total	80
Chemical Trades Training	
Chemical Laboratory Assistant	15
Chemical Process Operator	60
Sub Total	75
Grand Total	325

2.11 Density of Workers per Hectare

Kind of Industry	Density of Worker (person/ha)	Area* (ha)	No. of Employees (persons)
1. Consumer Related Group	118.2	220	26,000
Food	97.7	113.6	11,100
Textiles	—	—	—
Apparel	379.4	5.2	1,973
Lumber & Wood	59.7	15.9	949
Furniture	69.3	40.4	2,799
Rubber	118.5	23.6	2,796
Miscellaneous	299.7	21.3	6,383
2. Basic Materials Group	30.2	1530	46,200
Pulp & Paper	41.6	27.7	1,152
Chemicals	28.6	314.1	8,975
Petroleum & Coal	8.7	186.2	1,614
Nonmetallic Products	31.7	328.4	10,417
Iron & Steel	26.1	530.2	13,860
Non-ferrous Metals	55.3	98.0	5,423
Metal	104.8	45.4	4,759
3. Processing & Assembly	149.2	250	37,300
General Machinery	139.8	126.9	17,744
Electric Machinery	247.4	19.3	4,774
Transportation Equipment	134.8	97.4	13,128
Precision Machinery	262.5	6.4	1,654

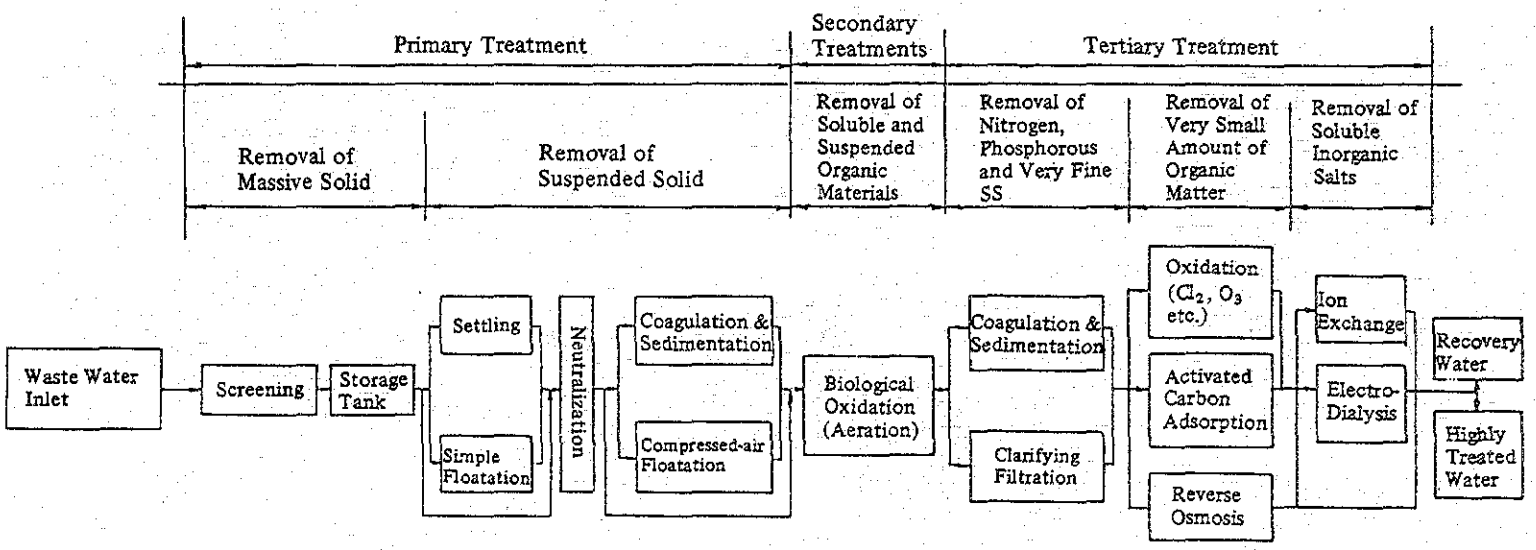
2.12 Trend of Recycled Industrial Water in Japan



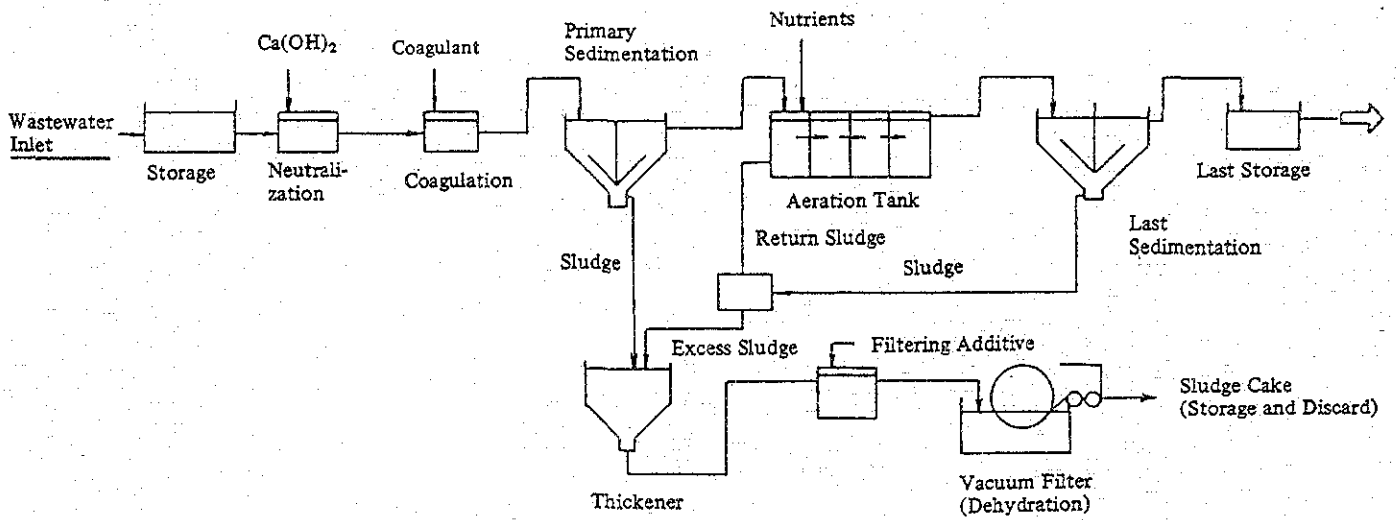


2.13 Outline of Industrial Waste Water Treatment Process

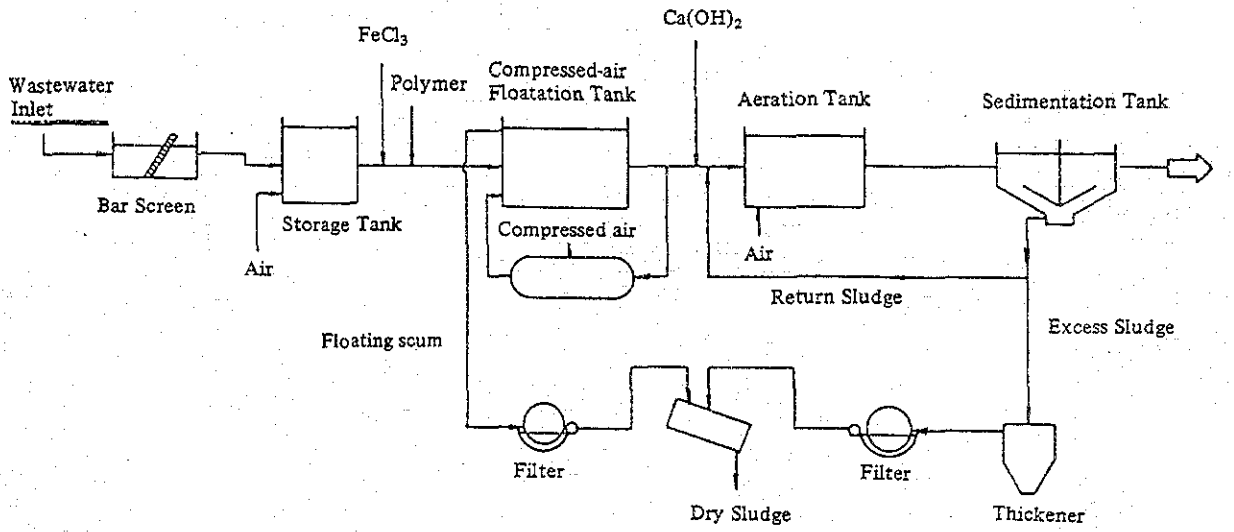
(1) Outline



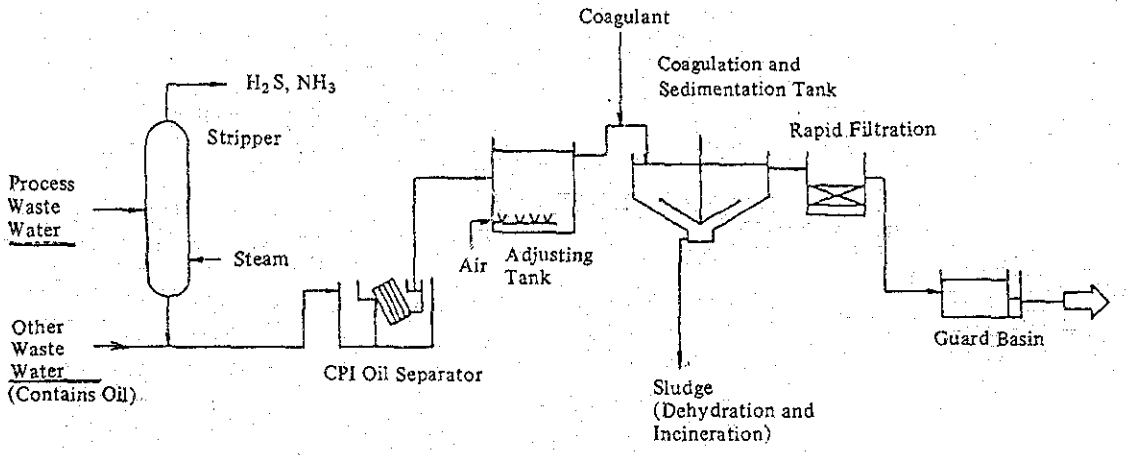
(2) Chemical Industry



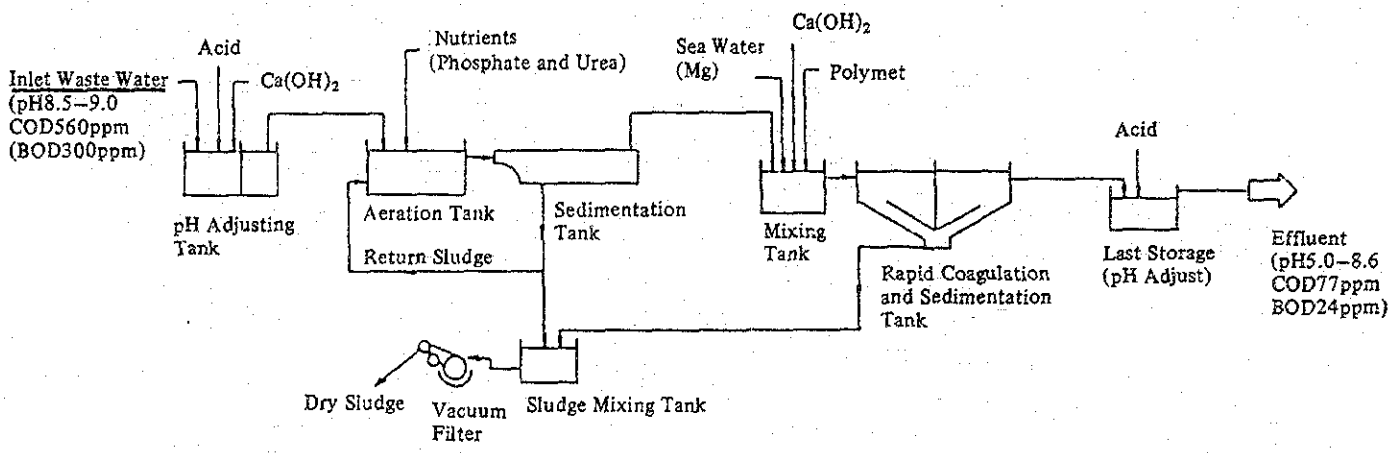
(3) Food Industry



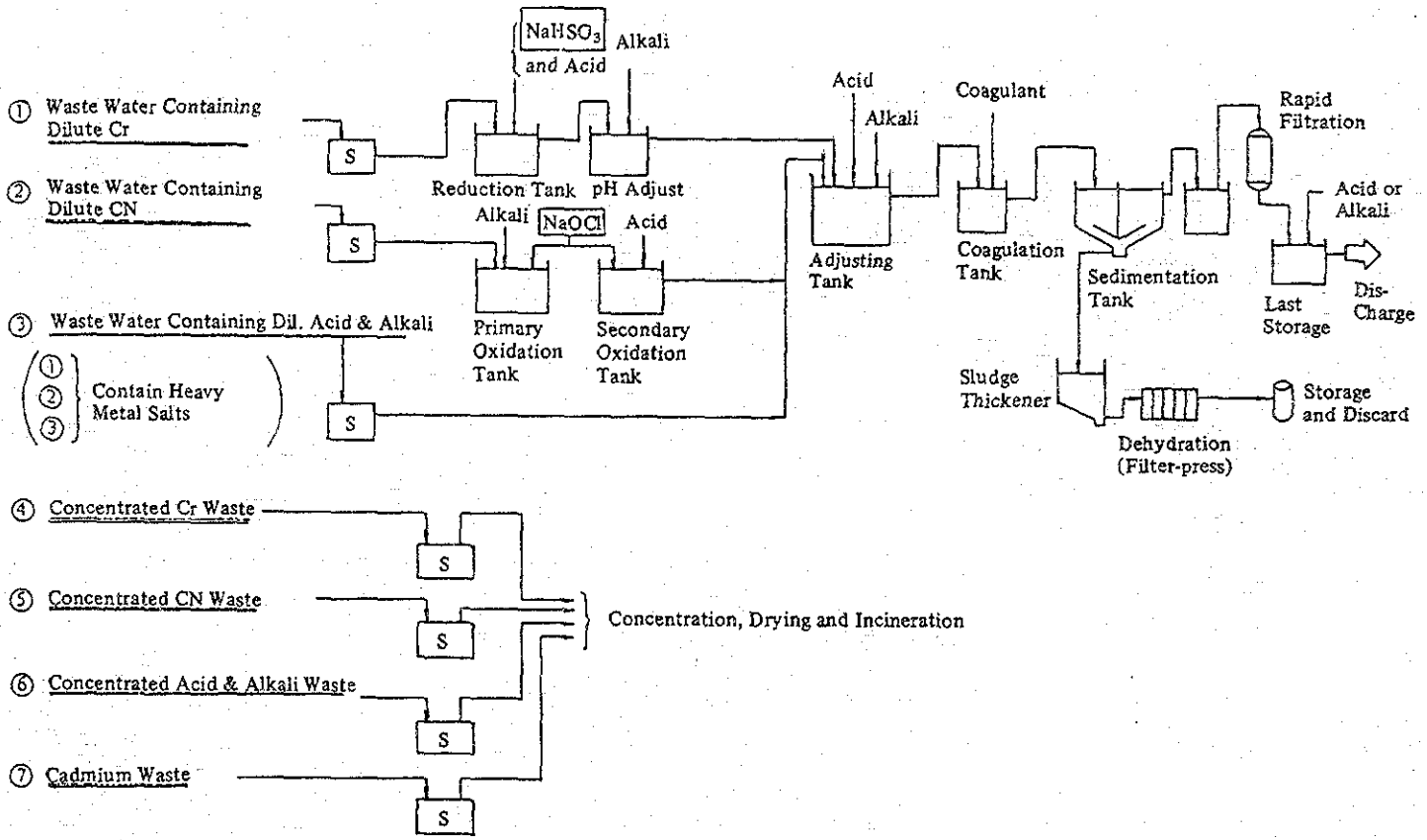
(4) Petroleum Refinary



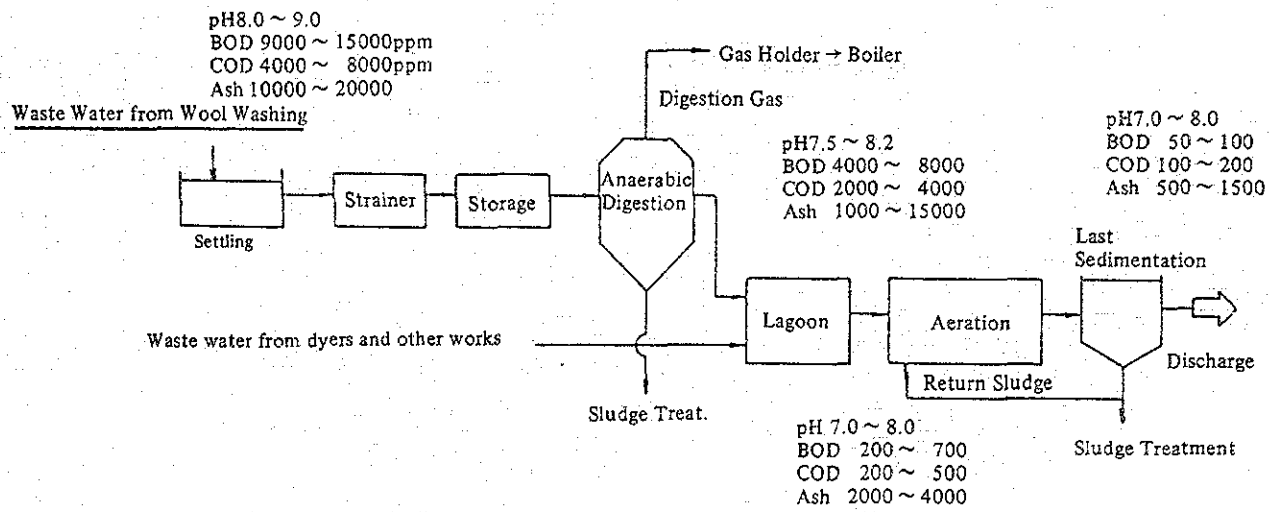
(5) Pulp Industry



(6) Electroplating Industry

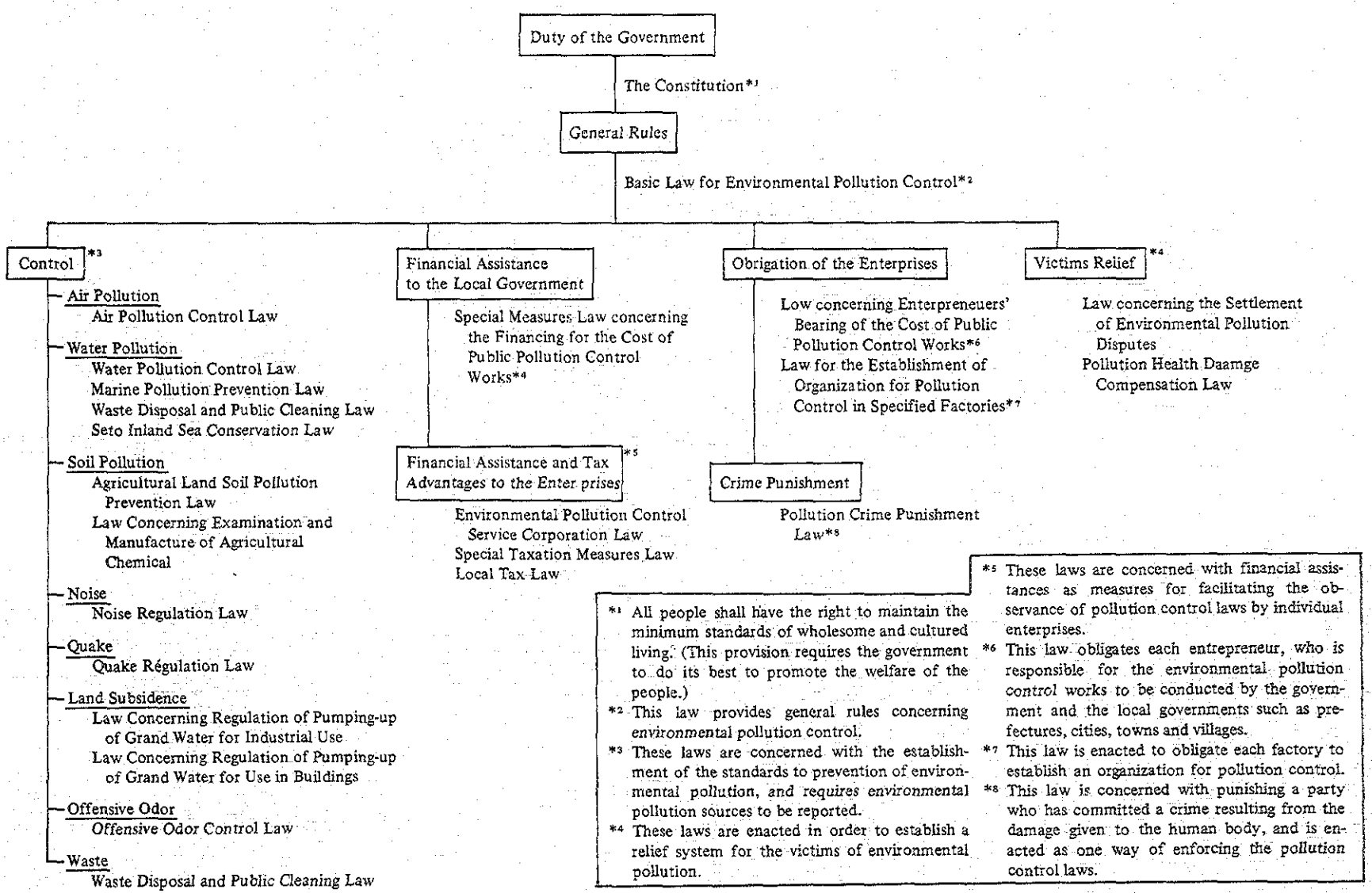


(7) Wool Industry



2.14 Environmental Pollution Control in Japan

(1) System of Laws



*1 All people shall have the right to maintain the minimum standards of wholesome and cultured living. (This provision requires the government to do its best to promote the welfare of the people.)

*2 This law provides general rules concerning environmental pollution control.

*3 These laws are concerned with the establishment of the standards to prevention of environmental pollution, and requires environmental pollution sources to be reported.

*4 These laws are enacted in order to establish a relief system for the victims of environmental pollution.

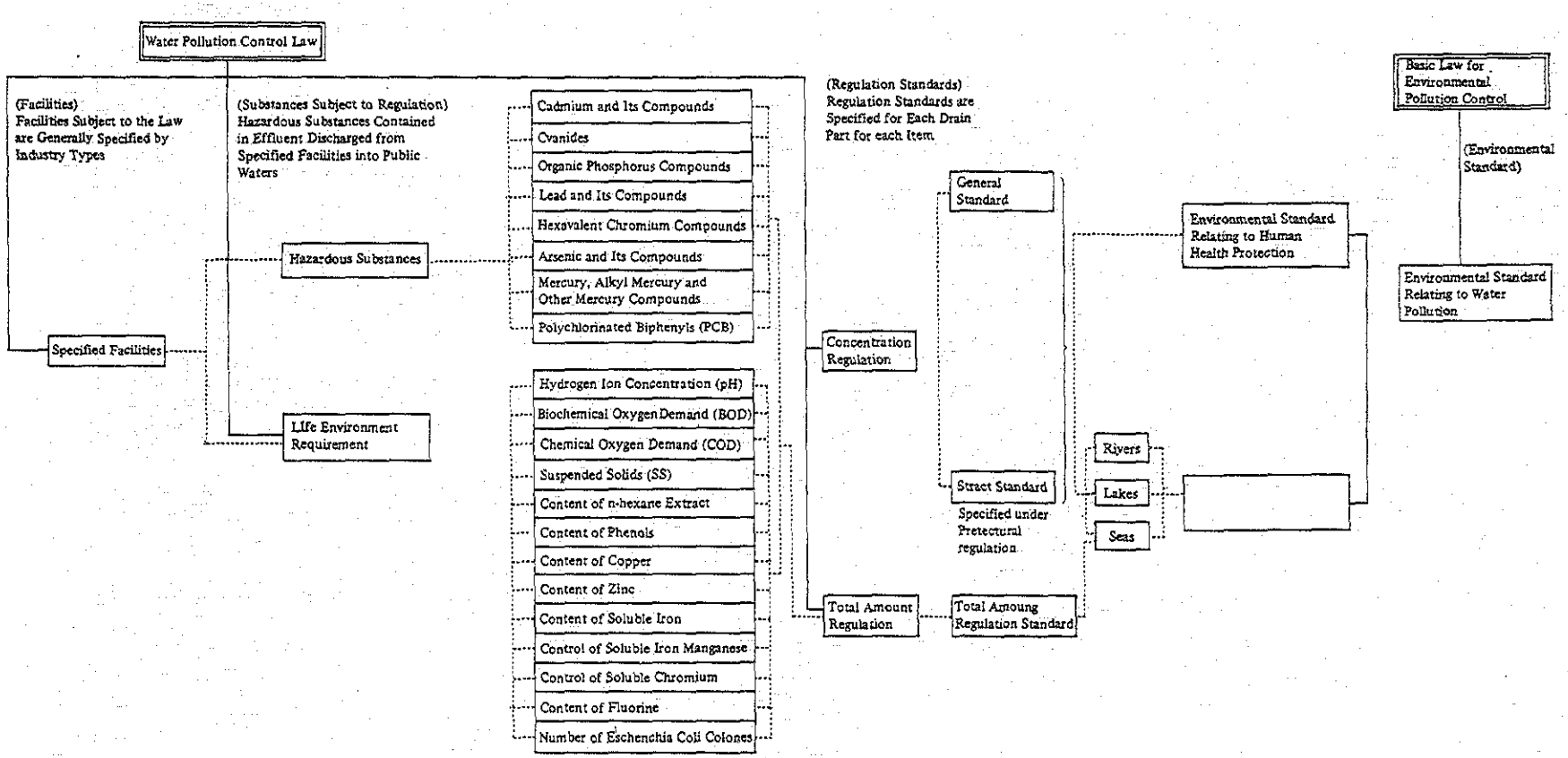
*5 These laws are concerned with financial assistances as measures for facilitating the observance of pollution control laws by individual enterprises.

*6 This law obligates each entrepreneur, who is responsible for the environmental pollution control works to be conducted by the government and the local governments such as prefectures, cities, towns and villages.

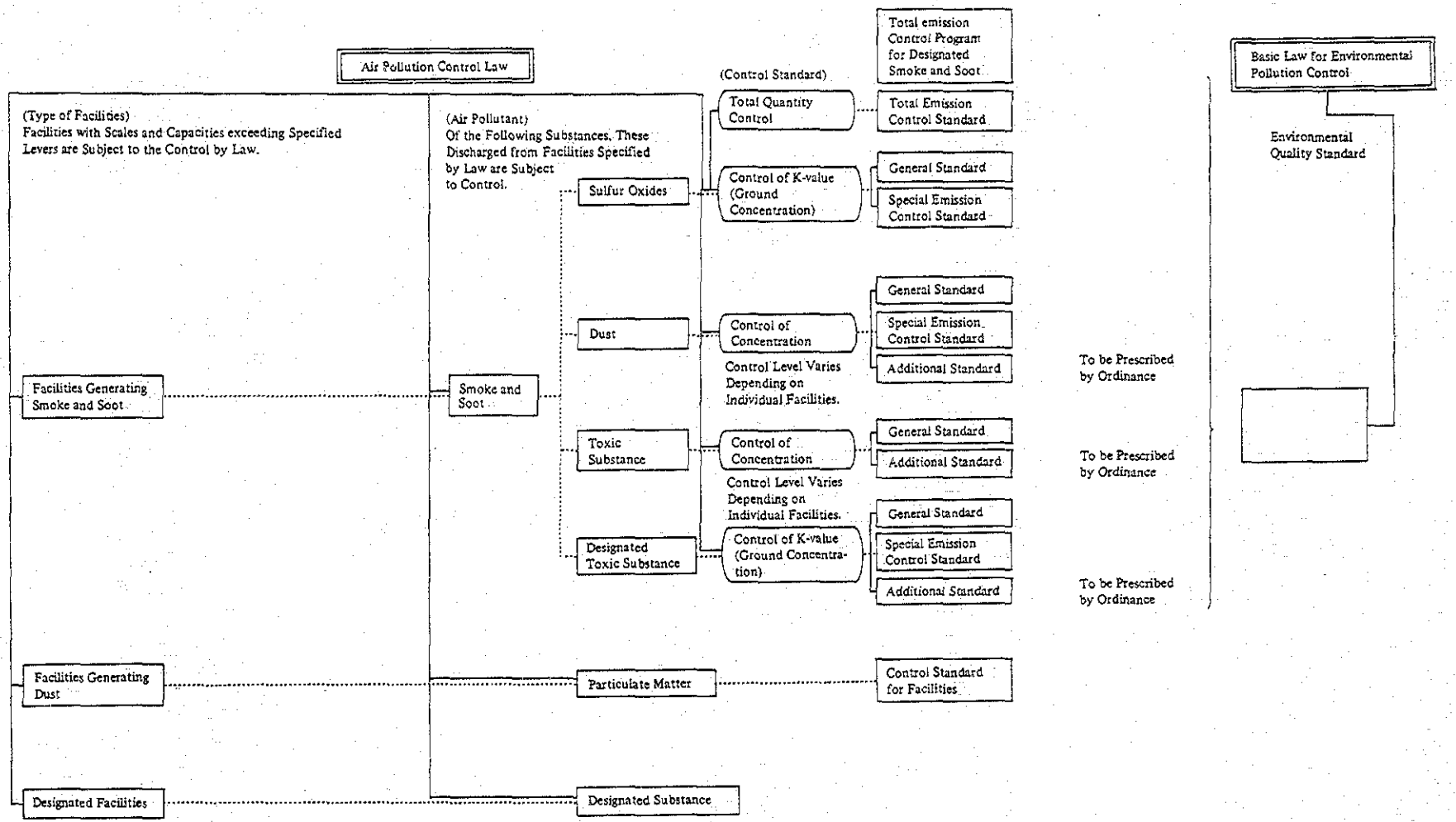
*7 This law is enacted to obligate each factory to establish an organization for pollution control.

*8 This law is concerned with punishing a party who has committed a crime resulting from the damage given to the human body, and is enacted as one way of enforcing the pollution control laws.

(2) Outline of the Water Pollution Control Law



(3) Outline of the Air Pollution Control Law



APPENDIX III

-- Tourism --

APPENDIX III

– Tourism –

(Present Conditions)

3.1 Breakdown of Foreign Visitor Flow by Category and Compound Growth Rates, 1970 ~ 1984

- International Tourists -

	Arrivals (Thousands)							Compound Annual growth Rates (%)	
	1970	1975	1980	1981	1982	1983	1984	1970-84	1980-84
1) Arab Countries	231	438	479	579	618	599	596	7.0	5.6
2) Western Europe	44	176	420	416	419	465	518	19.3	5.4
3) USA, Canada, Australia and Japan	28	81	191	205	209	240	256	17.1	7.6
4) Socialist Countries	29	35	24	22	23	26	27	-0.5	3.0
5) Others *	26	64	139	155	154	168	164	14.1	4.2
Total	358	793	1253	1376	1423	1498	1561	11.1	5.7

Note: * Others include: Asia, Africa, Latin America, Spain, Greece, Turkey, Portugal and Israel

Source : Ministry of Tourism, Statistical Bulletin

3.2 Breakdown of Nights Spent by Foreign Visitors by Category and Compound Growth Rate, 1970 ~ 1984

- International Tourists -

Category	Nights (Thousands)							Compound Annual Growth Rates (%)	
	1970	1975	1980	1981	1982	1983	1984	1970-84	1980-84
1) Arab Countries	3676	3622	3595	4637	4413	4139	3912	0.4	2.1
2) Western Europe	329	1133	2478	2893	2778	2639	2618	16.0	1.4
3) USA, Canada, Australia and Japan	134	459	1150	1356	1319	1317	1290	17.6	2.9
4) Socialist Countries	227	279	92	91	70	69	77	-7.4	-4.4
5) Others *	207	380	768	829	721	693	675	8.8	-3.2
Total	4573	5855	8084	9806	9301	8857	8572	4.6	1.5

Note: * Others include: Asia, Africa, Latin America, Spain, Greece, Turkey, Portugal and Israel

Source : Ministry of Tourism, Statistical Bulletin

3.3 Average Length of Stay by Categories 1970 ~ 1984

- International Tourists -

Category	Average Length (Days)						
	1970	1975	1980	1981	1982	1983	1984
1) Arab Countries	15.9	8.3	7.5	8.0	7.1	6.9	6.6
2) Western Europe	7.5	6.3	5.9	7.0	6.6	5.7	5.1
3) USA, Canada, Australia and Japan	4.7	5.7	6.0	6.6	6.3	5.5	5.0
4) Socialist Countries	7.8	8.0	3.8	4.1	3.0	2.7	2.9
5) Others*	8.0	5.9	5.5	5.3	4.7	4.1	4.1
Total	12.3	7.4	6.5	7.1	6.5	5.9	5.5

Note: * Others include: Asia, Africa, Latin America, Spain, Greece, Turkey, Portugal and Israel

Source : Ministry of Tourism, Statistical Bulletin

3.4 Number of Tourists by Country, 1982 ~ 1984

— Main Countries —

('000)

Category	Country	1982	1983	1984
Arab Countries	Saudi Arabia	162	162	150
	Palestine	127	118	117
	Sudan	126	123	70
	Jordan	42	40	40
	Kuwait	34	34	33
	Lebanon	15	18	18
OECD Countries	USA	157	184	188
	F. R. Germany	89	96	113
	France	100	100	111
	UK	78	83	95
	Italy	68	87	93
	Benelux	27	36	34
	Japan	22	26	33
	Greece	27	25	28
	Scandinavia	23	24	28
	Switzerland	21	23	25

Source: Ministry of Tourism, Statistical Bulletin

3.5 Monthly Distribution of Foreign Tourists by Category

(%)

Category / Year / Month	Arab Countries			OECD Countries		
	1975	1980	1981	1975	1980	1981
Jan.	5	5	6	6	6	6
Feb.	6	6	6	6	8	9
Mar.	6	5	5	11	11	11
Apr.	6	6	6	6	10	12
May	7	7	8	9	8	8
June	11	14	12	7	6	6
July	15	13	15	9	7	7
Aug.	12	14	15	10	9	9
Sep.	6	10	10	7	8	9
Oct.	11	7	7	9	10	8
Nov.	7	6	6	9	9	8
Dec.	8	7	4	11	8	7

Source: Ministry of Tourism, Statistical Bulletin,
Study Team Calculations

3.6 Monthly Distribution of Tourists and Nights Spent in Suez, 1984

Month	Number of Tourists		Nights Spent	
	Persons	%	Nights	%
Jan.	2,215	11.2	2,985	9.1
Feb.	2,079	10.4	3,366	10.2
Mar.	2,002	10.1	2,803	8.5
Apr.	1,704	8.6	2,217	6.7
May	1,243	6.2	2,369	7.2
Jun.	1,430	7.2	2,411	7.3
Jul.	1,932	9.7	3,375	10.3
Aug.	1,917	9.6	3,403	10.5
Sep.	1,462	7.3	2,898	8.8
Oct.	1,457	7.3	2,517	7.7
Nov.	1,243	6.2	1,920	5.8
Dec.	1,233	6.2	2,592	7.9
Total	19,917	100.0	32,856	100.0

Note: 1) Above numbers are based on the data from five major hotels in Suez City: Red Sea Hotel, Summer Palace Hotel, White House Hotel, Misr Palace Hotel and Boruvage Hotel.

2) Not only International tourists, but also domestic tourists are included.

Source: *Ministry of Tourism Information Centre in Suez*

3.7 Component Ratio of Number of Tourists in Suez by Country, 1984

Category	Component Ratio (%)
Egyptian	45.9
Arab Country Tourists	9.4
Other International Tourists	44.7

Note: *Percentages are estimated based on the number of tourists that stayed in five major hotels in Suez City during the year 1984.*

Source: Ministry of Tourism Information Centre in Suez.

3.8 Number of Hotels, Rooms and Beds in 1984/85

(5 and 4 star Hotels)

	1984/85			Rooms * in 1976
	No. of Hotels	Rooms	Beds	
Alexandria	10	1,407	2,801	550
Aswan	5	550	1,092	600
El-Arish	1	150	300	
Cairo	30	9,143	17,166	2,650
Hurgada	2	285	561	-
Ismailia	1	170	346	-
Luxor	7	1,470	2,930	650
Port Said	1	58	116	-
Sub Total	57	13,233	25,312	4,450
Floating Hotels	32	1,523	3,222	350
Total	89	14,756	28,534	4,800

(3 star and others)

	3 Stars		Below 3 Stars & Pensions	
	No. of Hotels	Rooms	No. of Hotels	Rooms
Alexandria	9	867	24	929
Aswan	1	140	8	402
Abu Simbel	1	20	-	-
El Arish	1	24	-	-
Baltim	-	-	3	58
Cairo	47	3,086	51	2,217
El Wadi El Guedid	-	-	1	30
Fayoum	1	33	2	36
Gamassa	1	40	3	58
Hurgada	-	-	1	30
Safaga	-	-	1	30
Ismailia	-	-	4	113
Kena	-	-	2	148
Luxor	1	54	11	339
Mansoora	-	-	1	50
Marsa Matruh	1	34	4	169
Menya	-	-	2	58
Port Said	1	81	14	524
Ras el Bar	-	-	10	526
Sinai	4	240	4	197
Suez	1	28	4	126
Tanta	1	40	-	-
El Mehalla El Kobra	-	-	1	24
Floating Hotels	5	156	15	333
Total	75	4,843	166	6,397

Source: *: National Plan for Tourism, Volume 0, 1978.
Others: Egyptian Hotel Guide 1984-1985 6th-edition, Egyptian Hotel Association

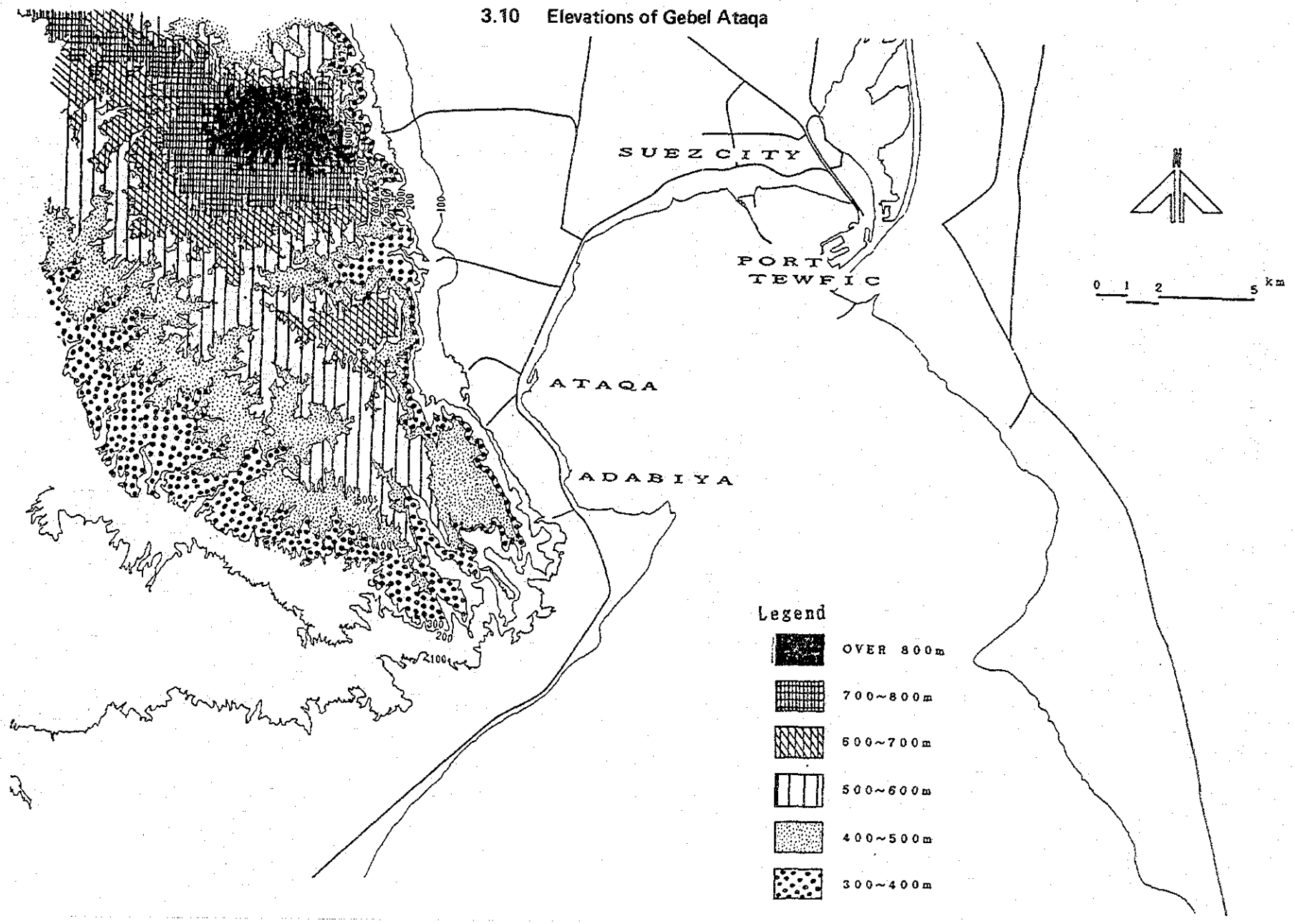
3.9 Present Distribution of Tourists by Means of Arrival

('000)

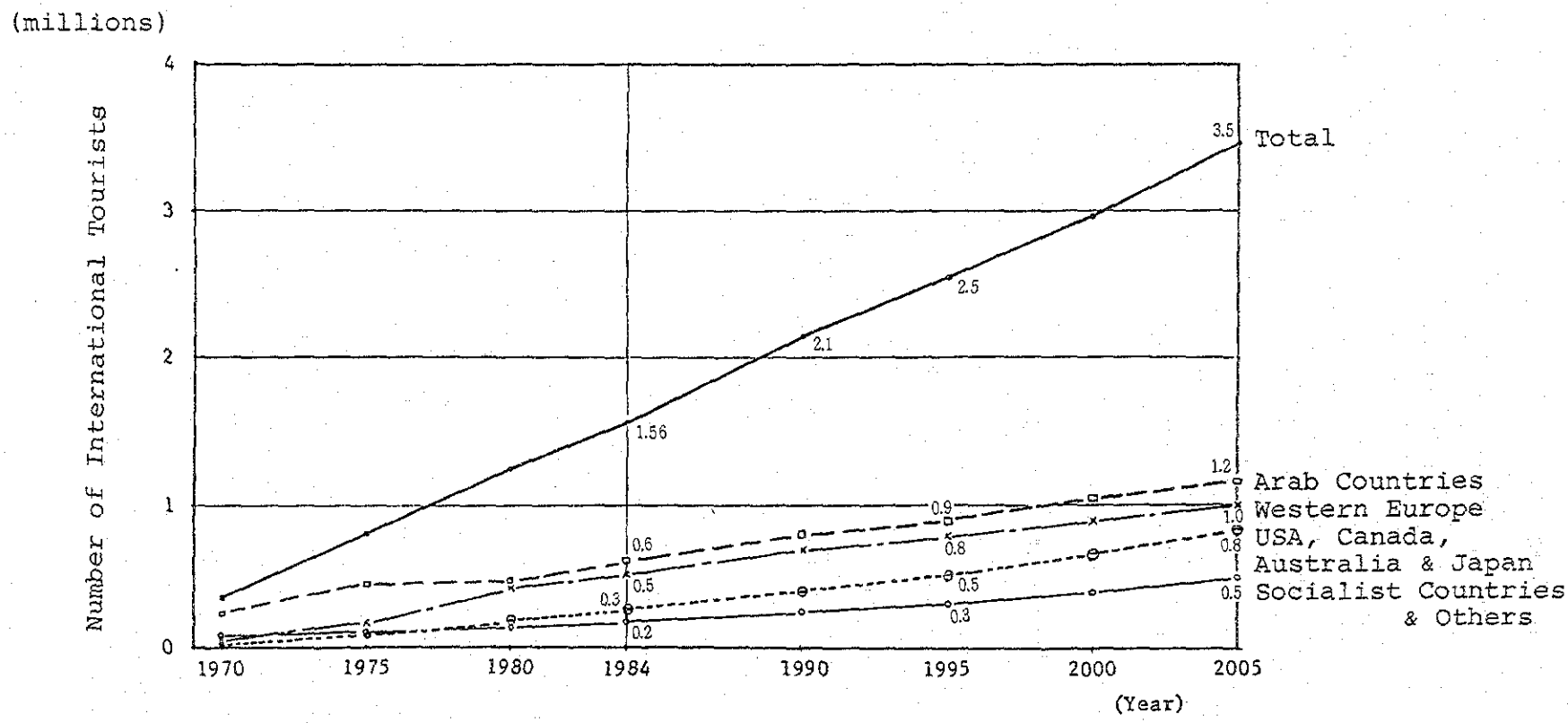
Item	1978	1979	1980	1981	1982	1983	1984
Airplane	856	860	987	1,059	1,029	1,108	1,169
Ship	160	162	171	142	149	162	168
Car	36	42	95	175	245	228	223
Total	1,052	1,064	1,251	1,376	1,423	1,498	1,560

Source: CAPMAS

3.10 Elevations of Gebel Ataqa



3.11 Projection of the Number of International Tourists in Egypt



Source: The Study Team

3.12 Annual Growth Rates of Foreign Tourists by Category Forecast in Previous Study

– Number of International Tourists –

(%)

	1985 ~ 1990	1990 ~ 2000
1) Western Europe	10	5
2) U.S.A., Canada, Australia and Japan	7.5	5
3) Socialist Countries	10	10
4) Arab Countries	2.5	2.5
5) Others	5	5

Source: Suez Canal Regional Tourism Development Plan, Volume I

3.13 Assumption of Share of Population Taking Holidays in Previous Study

–Domestic Tourists –

	(%)
1976	9
1990	20
2000	20 ~ 25

Source: Suez Canal Regional Tourism Development Plan, Volume I

3.14 Assumption of Share of Population Taking Day Trips to the Seashore in Previous Study

– Urban Population –

5%

Source: Suez Canal Regional Tourism Development Plan, Volume I

3.15 The Projection of Tourism Demand in Previous Studies

(1) International Tourists

– Whole Country –

(Thousands)

	1990	2000	2005
National Plan for Tourism, 1978	2,478	–	–
Suez Canal Regional Tourism Development Plan, 1978	2,184	3,401	–
Feasibility Study for New Alexandria International Airport Construction Project, JICA	1,930 ~ 2,160	2,790 ~ 3,270	3,390 ~ 5,260

(2) Domestic Tourists

– Whole Country –

	1976	1990	2000
Total Population (million) *	*36.8*	48.7	*60.2*
Percentage of Tourists (%)	9	20	20 ~ 25
Number of Tourists (million)	3.2	9.7	15.0

Note: * Egyptians Abroad are Excluded

Source: *Suez Canal Tourism Development Plan, 1978*

3.16 Tourist Demand per Peak Day in the Suez Bay Coastal Area

(Persons)

Year	Category	International Tourists	Domestic Tourists	Day Trippers	Total
1995	International Class Hotel	280	-	-	280
	Second Class Hotel	240	1400-2300 (1850)	-	1640-2540 (2090)
	Apartment, Bungalow, Villa	160	10500-17500 (14000)	-	10660-17660 (14160)
	Campsite	-	300-400 (350)	-	300-400 (350)
	Beach Cabin	-	-	24000	24000
	Total	680	12200-20200 (16200)	24000	36880-44880 (40880)
2005	International Class Hotel	600	-	-	600
	Second Class Hotel	590	5100-8900 (7000)	-	5690-9490 (7590)
	Apartment, Bungalow, Villa	440	38500-66500 (52500)	-	38940-66940 (52940)
	Campsite	-	900-1600 (1250)	-	900-1600 (1250)
	Beach Cabin	-	-	45000	45000
	Total	1630	44500-77000 (60750)	45000	91130-123630 (107380)

Note: ( ): mean

Source: The Study Team

3.17 Forecast Required Accommodations for the Suez Bay Coastal Area

(Rooms)

Year	Category	International Tourists	Domestic Holiday Makers	Day Trippers	Total
1995	International Class Hotel	160	-	-	160
	Second Class Hotel	135	800-1,300 (1,050)	-	935-1,435 (1,180)
	Apartment, Bungalow, Villa	30	1,800-3,000 (2,400)	-	1,830-3,030 (2,430)
	Beach Cabin	-	-	2,400	2,400
	Total	325	2,600-4,300 (3,450)	2,400	5,325-7,025 (6,175)
	Campsite	-	1 (ha)	-	1 (ha)
2005	International Class Hotel	340	-	-	340
	Second Class Hotel	330	2,900-5,000 (3,950)	-	3,230-5,330 (4,280)
	Apartment, Bungalow, Villa	80	6,700-11,600 (9,150)	-	6,780-11,680 (9,230)
	Beach Cabin	-	-	4,500	4,500
	Total	750	9,600-16,600 (13,100)		14,850-21,850 (18,350)
	Campsite	-	2 - 4 (ha) (3)	-	2 - 4 (ha) (3)

Note: ( ) mean

Source: The Study Team

3.18 Forecast Required Accommodations for International Tourists in the Suez Bay Coastal Area

Item	1995			2005		
	Arab	Others	Total	Arab	Others	Total
1) Nights Spend(Nights/Year)	110,000	32,000	142,000	290,000	46,000	336,000
2) Percentage of Peak Month (%) *1	15	12	-	15	12	-
3) Nights Spend during Peak Month	16,500	3,800	20,300	43,500	5,500	49,000
4) Required Accommodations (Beds, 3) ÷ 30 days)	550	130	680	1,450	186	1,630
5) Percentage by Categories (%) *2						
International Class Hotel	30	90	-	30	90	-
Second Class Hotel	40	10	-	40	10	-
Apartment, Bungalow, Villa	30	0	-	30	0	-
6) Required Accommodations (Beds)						
International Class Hotel	160	120	280	440	160	600
Second Class Hotel	230	10	240	570	20	590
Apartment, Bungalow, Villa	160	0	160	440	0	440
7) Persons per room *3						
International Class Hotel	1.6	1.6	-	1.6	1.6	-
Second Class Hotel	1.6	1.6	-	1.6	1.6	-
Apartment Bungalow, Villa	4.0	4.0	-	4.0	4.0	-
8) Required Accommodations						
International Class Hotel (rooms)	100	80	180	280	100	380
Second Class Hotel (rooms)	140	5	145	360	10	370
Apartment, Bungalow, Villa (units)	40	0	40	110	0	110
9) Service Standard (%) *4						
Hotel	90	90	-	90	90	-
Apartment, Bungalow, Villa	70	70	-	70	70	-
10) Planned Accommodations (Rooms)						
International Class Hotel	90	70	160	250	90	340
Second Class Hotel	130	5	135	320	10	330
Apartment, Bungalow, Villa	30	0	30	80	0	80

Note: *1 Current percentage in 1981 is adopted.

*2 Adopted from "National Plan for Tourism, 1978".

*3 Adopted from "Suez Canal Regional Tourism Development Plan, 1978 Vol.2".

*4 Based on experience in Japan: Only 70 - 90% of required accommodations in peak season are to be supplied considering the sound management of accommodations.

Source: The Study Team

3.19 Forecast Required Accommodations for Domestic Tourists in the Suez Bay Coastal Area

Item	1995					2005				
	Relatives	Second Class Hotel	Apartment, Villa, Bungalow	Campsite	Total	Relatives	Second Class Hotel	Apartment, Villa, Bungalow	Campsite	Total
1) Share (%) *1	50	7	42	1	100	50	7	42	1	100
2) Persons per Year ('000)	150-250	21-35	126-210	3-5	300-500	500-950	77-133	462-798	11-19	1100-1900
3) Length of Stay (days) *1	-	6	10	10	-	-	6	10	10	-
4) Nights per Year ('000)	-	126-210	1260-2100	30-50	1416-2360	-	462-798	4620-7980	110-190	5192-8968
5) Length of Season (days) *1	-	90	120	120	-	-	90	120	120	-
6) Required Accommodations (beds)	-	1400-2300	10500-17500	300-400	12200-20200	-	5100-8900	38500-66500	900-1600	44500-77000
7) Persons per Room *2	-	1.6	4.0	300 persons/ ha	-	-	1.6	4.0	300 persons/ ha	-
8) Required Accommodations (Rooms)	-	900-1400	2600-4400	1-1.5(ha)	-	-	3200-5600	9600-16600	3-5(ha)	-
9) Service Standard (%)	-	90	70	70	-	-	90	70	70	-
10) Planned Accommodations (Rooms)	-	800-1300	1800-3000	1.0 (ha)	-	-	2900-5000	6700-11600	2.1-3.5(ha)	-

Note: *1 Adopted from "Suez Canal Regional Tourism Development Plan, Vol. 1, p49"

*2 Adopted from "Suez Canal Regional Tourism Development Plan, Vol. 2, p227"

Source: The Study Team

3.20 Forecast Required Accommodations for Domestic Day Trippers in the Suez Bay Coastal Area

	1995	2005
No. of Sea Bathers ('000) per Peak Day	24	45
Persons per Cabin	5	5
No. of Cabins (rooms)	4800	9000
Service Standard (%)	50	50
Required No. of Cabins (rooms)	2400	2400

Source: The Study Team

3.21 Projection of Employment from Tourism Development by Category in the Suez Bay Coastal Area

Item		1995			2005		
		No. of Rooms	Employees per Room	No. of Employees	No. of Rooms	Employees per Room	No. of Employees
Direct Employment	International Class Hotel	160	1.5 *1	240	340	1.5 *1	510
	Second Class Hotel	935-1435	1.2 *2	1100-1700	3230-5330	1.2 *2	3880-6400
	Apartment, Bungalow, Villa	1830-3030	0.15 *3	270-450	6780-11680	0.15 *3	1020-1750
	Beach Cabin	2400	0.15 *3	360	4500	0.15 *3	680
	Sub Total	5325-7025	-	1970-2750	14850-21850	-	6090-9340
Multiplier Effect Employees *4		-	-	2360-3300	-	-	7300-11210
Total Employees		-	-	4330-6050	-	-	13390-20550

Note: *1 Adopted from "National Plan for Tourism, Vol. 0"

*2 Information from existing hotels

*3 Adopted from "Structure Plan for Suez Governorate, Vol. 1"

*4 1.2 persons per direct employee is assumed for those employed indirectly tourism (supply operations, guides, travel agents, etc.) - adopted from "National Plan for Tourism, Vol. 0"

Source: The Study Team

3.22 Number of Tourists, Rooms and Employees by Development Area

(1) Peak Season in 2005

- Average Case - *5

Item	Category	Ras Sudr	Sandy Beach (Ain Sukhna)	Masala, Ayun Musa	South Ain Sukhna	Suez City (Suez Creek)	Total
No. of Tourists per day	International Class Hotel	600	-	-	-	-	600
	Second Class Hotel	3590	3000	200	200	600	7590
	Apartment, Bungalow, Villa	10810	24550	17580	-	-	52940
	Beach Cabin	1000	22000	22000	-	-	45000
	Campsite	-	450	800	-	-	1250
	Total	16000	50000 *1	40580	200	600	107380
Required No. of Accommodations	International Class Hotel	340	-	-	-	-	340
	Second Class Hotel	2020	1690	150	120 *2	300 *2	4280
	Apartment, Bungalow, Villa	1880	4300	3050	-	-	9230
	Beach Cabin	100	2200	2200	-	-	4500
	Total	4340	8190	5400	120	300	18350
No. of Employees	Distrect Employees *3	3250	3000	970	150	350	7720
	Multiplier Effect Employees *4	3900	3600	1160	180	420	9260
	Total	7150	6600	2130	330	770	16980

Note: *1 Coast length (5 km) x 10 persons per metre of frontage = 50,000

*2 Instead of the existing 82 rooms of Ain Sukhna and 160 rooms of hotels in Suez City a figure twice as large is adopted for the analysis.

*3 1.5 persons per room for international class hotels
1.2 persons per room for second class hotels
0.15 persons per room for apartments, bungalows and beach cabins

*4 1.2 persons per direct employee is assumed for multiplier effect employees (adopted from "National Plan for Tourism, Vol. 0")

*5 Average numbers between maximum and minimum cases.

Source: The Study Team

(2) Peak Season in 1995

- Average Case -

Item	Category	Ras Sudr	Sandy Beach (Ain Sukhna)	Masala, Ayun Musa	South Ain Sukhna	Suez City (Suez Creek)	Total
Tourist demand per day *1	International Class Hotel	280	--	-	-	-	280
	Second Class Hotel	1090	200	-	200	600	2090
	Apartment, Bungalow, Villa	6160	8000	-	-	-	14160
	Beach Cabin	1000	15000	8000	-	-	24000
	Campsite	-	-	350	-	-	350
	Total	8530	23550	8000	200	600	40880
Required No. of Accommoda-tions	International Class Hotel	160	-	-	-	-	160
	Second Class Hotel	620	140	-	120	300	1180
	Apartment, Bungalow, Villa	1060	1370	-	-	-	2430
	Beach Cabin	100	1500	800	-	-	2400
	Total	1940	3010	800	120	300	6170
No. of Employees	Distrect Employees *2	1160	600	170	150	350	2430
	Multiplier Effect Employees *3	1390	720	200	180	420	2910
	Total	2550	1320	370	330	770	5340

Note: *1 Half of the demand in 2005 is proposed for Ras Sudr and Ain Sukhna development.
Some developments would be started in Masala and Ayun Musa in 1995.
The same scale of developments as of 2005 is adopted in South Ain Sukhna and Suez City.

*2 1.5 persons per room for International Class Hotels
1.2 persons per room for second class hotels
0.15 persons per room for apartments, bungalows and beach cabins

*3 1.2 persons per direct employee is assumed for multiplier effect employees (adopted from "National Plan for Tourism").

3.23 Tourist Demand per Annum by Type of Tourist and Hotel Category

(1) Ras Sudr

(Persons/Year)

Year	Category	International Tourists	Domestic Tourists			Total
			Holiday Makers	Day Trippers	Sub Total	
1995	1. International Class Hotel	15,650	-	-	-	15,650
	2. Second Class Hotel	13,410	12,750	-	12,750	26,160
	3. Villa, Bungalow, Apartment	8,940	72,000	-	72,000	80,940
	4. Beach Cabin	-	-	30,000	30,000	30,000
	5. Campsite	-	-	-	-	-
	Total	38,000	84,750	30,000	114,750	152,750
2005	1. International Class Hotel	29,800	-	-	-	29,800
	2. Second Class Hotel	29,300	45,000	-	45,000	74,300
	3. Villa, Bungalow, Apartment	21,900	124,000	-	124,000	145,900
	4. Beach Cabin	-	-	30,000	30,000	30,000
	5. Campsite	-	-	-	-	-
	Total	81,000	169,000	30,000	199,000	280,000

Note: Annual Demand of Day Trippers = Peak day demand x 30 days

30 days = 3 months (Vacation Season) x 2 days/week x 4 weeks + 6 days

(2) Ain Sukhna

(Persons/Year)

Year	Category	International Tourists	Domestic Tourists			Total
			Holiday Makers	Day Trippers	Sub Total	
1995	1. International Class Hotel	-	-	-	-	-
	2. Second Class Hotel	-	3,000	-	3,000	3,000
	3. Villa, Bungalow, Apartment	-	96,000	-	96,000	96,000
	4. Beach Cabin	-	-	450,000	450,000	450,000
	5. Campsite	-	-	-	-	-
	Total	-	99,000	450,000	549,000	549,000
2005	1. International Class Hotel	-	-	-	-	-
	2. Second Class Hotel	-	45,000	-	45,000	45,000
	3. Villa, Bungalow, Apartment	-	294,600	-	294,600	294,600
	4. Beach Cabin	-	-	660,000	660,000	660,000
	5. Campsite	-	5,400	-	5,400	5,400
	Total	-	345,000	660,000	1,005,000	1,005,000

Note: Annual Demand of Day Trippers. = Peak day demand x 30 days
3 months (Vacation Season) x 2 days/week x 4 weeks + 6 days = 30 days

(3) Masala, Ayun Musa

(Persons/Year)

Year	Category	International Tourists	Domestic Tourists			Total
			Holiday Makers	Day Trippers	Sub Total	
1995	1. International Class Hotel	-	-	-	-	-
	2. Second Class Hotel	-	-	-	-	-
	3. Villa, Bungalow, Apartment	-	-	-	-	-
	4. Beach Cabin	-	-	240,000	240,000	240,000
	5. Campsite	-	4,200	-	4,200	4,200
	Total	-	4,200	240,000	240,000	244,200
2005	1. International Class Hotel	-	-	-	-	-
	2. Second Class Hotel	-	3,000	-	3,000	3,000
	3. Villa, Bungalow, Apartment	-	211,000	-	211,000	211,000
	4. Beach Cabin	-	-	660,000	660,000	660,000
	5. Campsite	-	9,600	-	9,600	9,600
	Total	-	223,600	660,000	883,600	883,600

Note: Annual Demand of Day Trippers = Peak day demand x 30 days

30 days = 3 months (Vacation Season) x 2 days/week x 4 weeks + 6 days

(4) Suez City

(Persons/Year)

Year	Category	International Tourists	Domestic Tourists			Total
			Holiday Makers	Day Trippers	Sub Total	
1995	1. International Class Hotel	-	-	-	-	-
	2. Second Class Hotel	-	9,000	-	9,000	9,000
	3. Villa, Bungalow, Apartment	-	-	-	-	-
	4. Beach Cabin	-	-	-	-	-
	5. Campsite	-	-	-	-	-
	Total	-	9,000	-	9,000	9,000
2005	1. International Class Hotel	-	-	-	-	-
	2. Second Class Hotel	-	9,000	-	9,000	9,000
	3. Villa, Bungalow, Apartment	-	-	-	-	-
	4. Beach Cabin	-	-	-	-	-
	5. Campsite	-	-	-	-	-
	Total	-	9,000	-	9,000	9,000

(5) South Ain Sukhna

(Persons/Year)

Year	Category	International Tourists	Domestic Tourists			Total
			Holiday Makers	Day Trippers	Sub Total	
1995	1. International Class Hotel	-	-	-	-	-
	2. Second Class Hotel	-	3,000	-	3,000	3,000
	3. Villa, Bungalow, Apartment	-	-	-	-	-
	4. Beach Cabin	-	-	-	-	-
	5. Campsite	-	-	-	-	-
	Total	-	3,000	-	3,000	3,000
2005	1. International Class Hotel	-	-	-	-	-
	2. Second Class Hotel	-	3,000	-	3,000	3,000
	3. Villa, Bungalow, Apartment	-	-	-	-	-
	4. Beach Cabin	-	-	-	-	-
	5. Campsite	-	-	-	-	-
	Total	-	3,000	-	3,000	3,000

3.24 Tourist Demand per Peak Day by Type of Tourist and Hotel Category

(1) Ras Sudr Area

(Persons/days)

Year	Category	International Tourists	Domestic Tourists			Total
			Holiday Makers	Day Trippers	Sub Total	
1995	1. International Class Hotel	280	-	-	-	280
	2. Second Class Hotel	240	850	-	850	1,090
	3. Villa, Bungalow, Apartment	160	6,000	-	6,000	6,160
	4. Beach Cabin	-	-	1,000	1,000	1,000
	5. Campsite	-	-	-	-	-
	Total	680	6,850	1,000	7,850	8,530
2005	1. International Class Hotel	600	-	-	-	600
	2. Second Class Hotel	590	3,000	-	3,000	3,590
	3. Villa, Bungalow, Apartment	440	10,370	-	10,370	10,810
	4. Beach Cabin	-	-	1,000	1,000	1,000
	5. Campsite	-	-	-	-	-
	Total	1,630	13,370	1,000	14,370	16,000

(2) Ain Sukhna

(Persons/day)

Year	Category	International Tourists	Domestic Tourists			Total
			Holiday Makers	Day Trippers	Sub Total	
1995	1. International Class Hotel	-	-	-	-	-
	2. Second Class Hotel	-	200	-	200	200
	3. Villa, Bungalow, Apartment	-	8,000	-	8,000	8,000
	4. Beach Cabin	-	-	15,000	15,000	15,000
	5. Campsite	-	-	-	-	-
	Total	-	8,200	15,000	23,200	23,200
2005	1. International Class Hotel	-	-	-	-	-
	2. Second Class Hotel	-	3,000	-	3,000	3,000
	3. Villa, Bungalow, Apartment	-	24,550	-	24,550	24,550
	4. Beach Cabin	-	-	22,000	22,000	22,000
	5. Campsite	-	450	-	450	450
	Total	-	28,000	22,000	50,000	50,000

(3) Masala, Ayun Musa

(Persons/day)

Year	Category	International Tourists	Domestic Tourists			Total
			Holiday Makers	Day Trippers	Sub Total	
1995	1. International Class Hotel	-	-	-	-	-
	2. Second Class Hotel	-	-	-	-	-
	3. Villa, Bungalow, Apartment	-	-	-	-	-
	4. Beach Cabin	-	-	8,000	8,000	8,000
	5. Campsite	-	350	-	350	350
	Total	-	350	8,000	8,350	8,350
2005	1. International Class Hotel	-	-	-	-	-
	2. Second Class Hotel	-	200	-	200	200
	3. Villa, Bungalow, Apartment	-	17,580	-	17,580	17,580
	4. Beach Cabin	-	-	22,000	22,000	22,000
	5. Campsite	-	800	-	800	800
	Total	-	18,580	22,000	40,580	40,580

(4) South Ain Sukhna

(Persons/day)

Year	Category	International Tourists	Domestic Tourists			Total
			Holiday Makers	Day Trippers	Sub Total	
1995	1. International Class Hotel	-	-	-	-	-
	2. Second Class Hotel	-	200	-	200	200
	3. Villa, Bungalow, Apartment	-	-	-	-	-
	4. Beach Cabin	-	-	-	-	-
	5. Campsite	-	-	-	-	-
	Total	-	200	-	200	200
2005	1. International Class Hotel	-	-	-	-	-
	2. Second Class Hotel	-	200	-	200	200
	3. Villa, Bungalow, Apartment	-	-	-	-	-
	4. Beach Cabin	-	-	-	-	-
	5. Campsite	-	-	-	-	-
	Total	-	200	-	200	200

(5) Suez City

(Persons/day)

Year	Category	International Tourists	Domestic Tourists			Total
			Holiday Makers	Day Trippers	Sub Total	
1995	1. International Class Hotel	-	-	-	-	-
	2. Second Class Hotel	-	600	-	600	600
	3. Villa, Bungalow, Apartment	-	-	-	-	-
	4. Beach Cabin	-	-	-	-	-
	5. Campsite	-	-	-	-	-
	Total	-	600	-	600	600
2005	1. International Class Hotel	-	-	-	-	-
	2. Second Class Hotel	-	600	-	600	600
	3. Villa, Bungalow, Apartment	-	-	-	-	-
	4. Beach Cabin	-	-	-	-	-
	5. Campsite	-	-	-	-	-
	Total	-	600	-	600	600

3.25 The Reason why Large-Scale Tourism Development can not be Propsed in Ayun Musa

1) Ras Sudr is the most suitable location for the large-scale tourism development because of its concentration of population and public services.

2) The target population of 50,000 on the eastern coast is too small to be divided into several areas. If Ayun Musa were developed as a large-scale project, a new community would have to be built adjacent to Ayun Musa in addition to Ras Sudr.

3) In Ayun Musa, beach resort development seems to be very difficult because of the distance between Ayun Musa village and the clean seashore.

4) Even if the beach adjacent to Ayun Musa were developed, water frontage for pleasure boats is very limited because of the anchorage area for the vessels passing through the Suez Canal.

5) In Massala, 15 km south from Ayun Musa, a conceptual plan for beach resort development has been initiated by the Ras Sudr council.

APPENDIX IV

– Transportation –

1. Product Study Review
2. Estimation of Necessary Port Facilities
3. Design Conditions
4. Preliminary Design of the Grain Terminal
5. Preliminary Design of Container Terminal

4.1 Product Study Review

The future trends of production and consumption of major commodities were estimated in past studies such as "National Transport Study, Phase II and Phase III" by NEDECO, "National Plan of Foreign Trade" by the High Technical Council of the Ministry of Maritime Transport and "Development Policy Port Strategy" by Harris. Here, in this study, revised estimates are calculated based on the new data provided by CAPMAS and the production studies in ENTS II, ENTS III and NPFT.

(1) Wheat

The past trend of wheat production and the future production estimates from ENTS III and NPFT are shown in the following table.

('000 tons)

		Actual					Forecast 200	
		1980	1981	1982	1983	1984	ENTS III	NPFT
Area Cultivated ('000 feddans)		1,326	1,400	1,374	1,320	1,178	1,450	
								(1,590)
Production ('000 tons)	Gross*1	1,796	1,938	2,017	1,996	1,815	2,320	2,700 (2%) 3,430 (3%)
	Net*2	1,616	1,744	1,815	1,796	1,634	2,088	(2,743)

Note: (1) The cultivated area and gross production values are from the CAPMAS-Statistical Yearbook.
(2) Figures in parentheses denote the projected 1987 value in the current Five Year Plan.
*1: NPFT based on $1,800 \times 10^3$ tons in 1981 and increase rates of 2% and 3%. If based on 1,744 (Net) in 1981, values for 2000 become $2,541 \times 10^3$ (2%) and, $3,058 \times 10^3$ (3%).
*2: Net value assumes that 10% of the wheat is used as seed.

The future consumption of wheat is estimated based on domestic production and imports as follows:

('000 tons)

	Actual					Forecast 200	
	1980	1981	1982	1983	1984	ENTS III	NPFT
Domestic Production (Net)	1,616	1,744	1,815	1,796	1,634	2,088 2,088	2,700 3,430
Imports	4,508	4,236	4,227	N.A.	N.A.	9,425 10,724	7,120 9,300
Total Consumption	6,124	5,980	6,042				
Indirect Wheat Consumption*1	1,116	1,728	1,548			2,290 2,340	
Total*2	7,240	7,708	7,590			13,803 15,152	10,000(2.5%) 12,000(4.0%)

Note: *1: Wheat/flour Ratio is 1.163.
*2: Estimated consumption by NPFT based on $6,040 \times 10^3$ tons in 1981.

However, NPFT seems to have omitted flour imports. New estimates after adding flour imports to the NPFT values are 12,322 x 10^3 tons (2.5%) and 16,240 x 10^3 (4%). Considering the past consumption per capita of 176 kg/cap. ~ 184 kg/cap., the estimated consumption of 12,322 x 10^3 tons (2.5%) seems reasonable.

Necessary wheat imports are estimated as follows:

('000 tons)

	Production (2%)	Production (3%)
Consumption	12,322	12,322
Production	2,541	3,058
Imports	9,781	9,264

The domestic milling rates for past three years were 84.6%, 77.6% and 79.6% respectively. This study assumes a 90% domestic milling rate in 2000. Estimated wheat and flour imports in the year 2,000 are as follows (Domestic production of wheat is assumed to increase by 3% per year):

('000 tons)

Wheat	8,338
Flour	926

(2) Maize

The past production and the future production estimates from ENTS III and NPFT are shown in the following table.

('000 tons)

	Actual					Forecast 200	
	1980	1981	1982	1983	1984	ENTS III	NPFT
Maize Production ('000 t)	3,231	3,308	3,347	3,509	3,698	4,380 4,380	*4,900 7,100
Cultivated Area ('000 feddans)	1,906	1,924	1,935	1,952	1.975		

Note: (1) Actual values are based on the CAPMAS Statistical Yearbook.
(2) Figures in parentheses denote the projected 1987 Plan.
(3) NPFT based on 2,800 x 10^3 tons in 1981. The new CAPMAS estimates based on 3,308 x 10^3 tons are 5,803 x 10^3 tons (3%) and 8,359 x 10^3 tons (5%). The production increase rate over the past 5 years ranged from 1.2% to 5.4%.

Consumption of maize is estimated from domestic production and imports as follows:

('000 tons)

	Actual					Forecast 200	
	1980	1981	1982	1983	1984	ENTS III	NPFT
Consumption*1	3,787	4,435	4,537			7,050 7,550	7,200
Production (Net)*2	3,037	3,110	3,146	3,298	3,476	3,850 3,850	4,900 (3%) 7,100 (5%)
Imports	750	1,325	1,391	N.A.	N.A.	3,200 3,700	1,400 2,600

Note: *1: NPFT based on $4,100 \times 10^3$ tons in 1981 for consumption. The new estimate is $7,777 \times 10^3$ tons based on the actual values.
*2: Net value assumes that 6% of the corn is used as seed.

The new import estimate is shown in the following table assuming a domestic production increase of 3% per year.

('000 tons)

Consumption	7,777
Production	5,803
Import	1,974 1974

(3) Phosphate

The historical production and export data of phosphate rock and of phosphorous fertilizer production are shown in the following table.

('000 tons)

	1977	1978	1979	1980	1981	1982	1983	1984
Phosphorous Fertilizer	513	494	483	488	474	512	588	847
Phosphate rock	567	639	623	679	737	691	783	946
Export	N.A.	54	–	139	178	303	N.A.	N.A.
Domestic Consumption		585	623	540	559	388		

Source: CAPMAS Statistical Yearbook.

From the above table, it seems that exports account for roughly 20 ~ 25% of production. The input ratio of phosphate rock in phosphorous fertilizer is estimated as 1,107 ~ 1,290. Therefore, the new estimate of necessary phosphate rock for fertilizer production is $1,161 \times 10^3 \sim 996 \times 10^3$ tons based on the estimated phosphorous fertilizer production of 670×10^3 (H) ~ 900×10^3 tons (L) in ENTS

III, and total production is estimated as 1,548 x 10^3 ~ 1,328 x 10^3 tons. Then, phosphate export is estimated as 387 x 10^3 ~ 332 x 10^3 tons.

In this study, phosphate export is estimated as 360 x 10^3 tons. The following table shows the comparison of different phosphate export estimates.

('000 tons)

ENTS III	NPFT	IBRD	The Study Team
400	6,000	300	360

(4) Coal & Coke

Imported coal and coke are currently used in Egypt. According to GOFI, the production of coal will be possible by 1987/88 by reopening the Maghara Coal Mine. The expected production volume in the year 2000 is 600 x 10^3 tons/year; 125 x 10^3 tons in 1988/89 and 300 x 10^3 tons in 1990/91. 450 x 10^3 tons of the 600 x 10^3 tons will be used as coke in Helwan.

Past and estimated future coal imports in ENTS III and NPFT are shown in the following table.

('000 tons)

	Actual					Forecast 2000	
	1978	1979	1980	1981	1982	ENTS III	NPFT
Imports	920	1,190	1,343	1,347	1,213	10,550 8,050	11,500 8,000

In this study, the NETS III estimates are applied. There is no reason to revise these estimates except for the new demand from the iron & steel mill planned in this study.

(5) Iron Ore & Pellets

Iron ore in Egypt is currently produced at Baharia Oasis. Past data and future estimates of domestic production, imports and domestic consumption are listed in the following table. ENTS III and NPFT estimated imports considering the expansion of the Helwan Iron & Steel Mill and the Dekheila project. In ENTS III, marginal production at Baharia Oasis is estimated as 2,500 x 10^3 tons per year.

('000 tons)

	Actual					Forecast 2000	
	1978	1979	1980	1981	1982	ENTS III	NPFT
Consumption		1,640	2,023	2,234	2,302		(2,500)
Production	1,468	1,435	1,776	1,944	2,139		(2,500)
Import	–	205	247	290	163	2,600 2,900	2,500 3,000

Note: Current Production at Helwan Iron & Steel Works (Hadisolb) : $1,100 \times 10^3$ tons/year
Current Consumption : $2,000 \times 10^3$ tons/year (Iron Ore)
Future Production : $1,500 \times 10^3$ tons/year in 1987
$2,200 \times 10^3$ tons/year in 2000
Future Consumption : $2,700 \times 10^3$ tons/year in 1987
$4,000 \times 10^3$ tons/year in 2000

Source: CAPMAS Statistical Yearbook, Port Statistics from Port Authorities

The El Dekheila Project should develop as follows.

	1987	1992		2000	
		Low	High	Low	High
Pellets	194	636	707	707	848
Lump Ore	82	297	303	303	364
Scrap Iron	35	128	142	142	170
Total	311	1,061	1,152	1,152	1,382

Note: (1) 1987 import volumes are based on the anticipated 1st year output of the plant of 205,000 tons.
(2) 1992 (High) volumes are based on full production (745,000 tons)
(3) 1992 (Low) volumes are based on production at 90% of capacity.
(4) 2000 (High) volumes are based on a 20% production increase over present (long-term) plans.

Source: ENTS III.

(6) Cement

Cement is currently produced by National Cement Co., Alexandria Cement Co., Tourah Cement Co., Helwan Cement Co., Suez Cement Co. and Maadi Cement Co. The past data and future estimates of production, imports, exports and consumption are listed in the following table.

('000 tons)

	Actual							Forecast 2000	
	1978	1979	1980	1981	1982	1983	1984	ENTS III	NPFT
Production*1	2,722	2,987	3,038	3,446	3,631	3,798	4,534	19,700 28,600	
Import*2	1,690	3,363	3,845	5,153	6,528	N.A.	N.A.	3,180 5,720	
Export*2	28	1	–	2	1				2,000
Consumption	4,384	6,349	6,883	8,597	10,158			22,880 34,320	

Note: *1: CAPMAS Statistical Yearbook
*2: Port Statistics from Port Authorities

The average production increase during the past five years was 11% per year. Estimated production in 2000 is 24,080 x 10^3 tons assuming on average increase rate of 11% per year in the future.

The past consumption of cement is closely correlated to the GDP of the construction sector. Therefore, the future consumption of cement is estimated as 43,168 x 10^3 tons in 2000 and necessary imports as 19,088 x 10^3 tons based on the projected GDP of the construction sector.

The past values and future estimate of the GDP of the construction sector are listed below.

(Million LE)

	1978	1979	1980	1981	1982	2000
GDP of the Construction Sector	603	664	717	909	973	3,451

Note: $y = 13.4x - 3075$ ($R = 0.972$)
y : Cement Consumption x 10^3 tons
x : GDP of the Construction Sector in million LE

(7) Fertilizer

Nitrogen fertilizer is produced by four plants in Aswan, Suez, Talka and Helwan, and past production and capacity is stated in the follwing table from ENTS II and III.

Production of Fertilizer by Type and Company in the Period 1968 ~ 1978

(in 1,000 t)

Company	Location	Q'ty	Type of Fertilizer	68/69	69/70	70/71	71/72	1973	1974	1975	1976	1977	1978
Kima	Aswan	370	Calcium amm. nitrate	371	377	380	400	153	253	293	282	303	301
Nasr Fertil. Co.	Suez	240	Calcium nitrate	–	–	–	–	–	–	–	24	73	199
Nasr Fertil. Co.	Talka	250 520	Calcium amm. nitrate Ureum plant	–	–	–	–	–	–	61	204	204	222
Nasr Coke Works	Helwan	120	Calcium amm. nitrate	–	–	–	79	51	62	64	54	74	66
Nasr Coke Works	Helwan		Amm. sulphate	4	4	4	3	4	7	9	7	9	8
Total			Nitrogen Fertilizer	375	381	384	482	208	322	427	571	663	796

According to the statistical yearbook of CAPMAS, total production of nitrogen fertilizer is as follows, and there is a large difference between the two tables.

('000 tons)

	1977	1978	1979	1980	1981	1982	1983	1984
Calcium Nitrate (N_2 15.5%)	1,244	1,386	1,701	2,584	3,346	4,122	4,133	4,123
Calcium Nitrate (N_2 31%)	509	301	512	N.A.	633	570	621	455
Ammonia Sulphate	11	11	13	N.A.	6	10	–	–
Total	1,764	1,698	2,226	N.A.	3,985	4,702	4,754	4,578

Phosphate fertilizer is produced by three plants operated by Abu Zaabal Fertilizer Co. and El Nasr Phosphate Co. (Kafr El Zayat & Asyut). ENTS II stated past production as follows:

('000 tons)

			68/69	69/70	70/71	71/72	1973	1974	1975	1976	1977	1978
Abu Zaabal Fert. Co.	Abu Zaabal	Single Super Ph.	126	131	134	122	137	112	151	160	131	139
El Nasr Phosphate Co.	Asyut	Single Super Ph.	–	125	144	285	183	164	184	188	202	207
El Nasr Phosphate Co.	Kaft El Zayat	Single Super Ph.	196	188	169	206	143	188	185	175	175	146
Total		Phosphate Fertilizer	544	444	447	613	403	464	520	523	508	492

According to the Statistical Year Book by CAPMAS, total production is as follows:

('000 tons)

	1977	1978	1979	1980	1981	1982	1983	1984
Single Super Phosphate	513	494	483	488	474	512	588	847
Thomas Phosphate	28	27	17	19	18		–	–
Total	541	521	501	507	492	512	588	847

In Egypt, all potassium fertilizer is imported. Past consumption is estimated as follows based on past fertilizer import and production (by CAPMAS data).

('000 tons)

	1978	1979	1980	1981	1982	2000	
						ENTS III	NPFT
Domestic Prod.	2,219	2,727	3,603	4,477	5,214		3,370 3,600
Import	1,118	698	611	951	235	35 (150) 45 (250)	340 350
Consumption	3,337	3,425	4,214	5,428	5,449	3,417 3,992	3,710 3,950

From the above-mentioned analysis, it seems that the NPFT estimation is rather reasonable.

(8) Salt, Sulphur, Manganese

1) Most salt in Egypt is produced by El Nasr Salines Co. which has five plants as follows:

('000 tons)

Location	1975	1976	1977	1978
El Mex (Alexandria)	528	521	470	520
Port Said	–	69	128	186
Balteem	8	4	6	5
Edku	7	4	6	5
Wadi El Natrun	6	3	2	4
Total	550	601	612	732

Salt production by CAPMAS Statistical Yearbook, export by Port Authorities data and estimated exports by ENTS III and NPFT are shown in the following table.

('000 tons)

	Actual					Forecast 2000	
	1978	1979	1980	1981	1982	ENTS III	NPFT
Production	755	728	728	858	883	724	
Export	159	45	49	14	2	150	0

ENTS III stated that 46% of domestic consumption was for human consumption and the rest for industrial use, and that human consumption per capita was 6 ~ 7 kg/cap.

Domestic consumption is estimated as follows based on the above-mentioned per capita consumption and data on production and export provided by CAPMAS.

('000 tons)

	1978	1979	1980	1981	1982
Industrial Use	338	417	405	561	591
Human Consumption	258	266	274	283	290
Total	596	683	679	844	881

Future consumption is estimated as follows:

○ Industrial use $591 \times (1.08)^{18} = 2362$ ('000 tons)

here, the increase ratio of related industrial production is assumed to be 8% per year.

○ Human consumption 6750 x 18000 persons/4467.3 x 10000 persons x 290 = 438 ('000 tons)

here, per capita consumption is assumed to be maintained at the current level.

Future production is estimated as 2,935 x 1,000 tons under the assumption that the average increase rate of production is 6.9% per year which is the average of the past 3 years, taking the possibility of production by Sodium Chemical Complex at Fayum and at Qarum Lake into consideration.

As a result, possible exports are estimated as 135×10^3 tons.

2) SULPHUR/PYRITE

Sulphur is not produced in Egypt. Imported Sulphur is mainly used by the phosphate fertilizer industry.

The past performance of imports and the forecast volumes are listed in the following table.

('000 tons)

	Actural					Forecast 2000	
	1978	1979	1980	1981	1982	ENTS III	NPFT
Sulphur/Pyrite	129	7	100	48	–	350 277	400 200

(9) Cotton & Cotton Products

The past performance of cotton products as reported in the Statistical Yearbook of CAPMAS as well as future estimates are presented in the following table.

('000 tons)

	Actual					Forecast 2000	
	1978	1979	1980	1981	1982	ENTS III	NPFT
Cultivated Area ('000 feddans)	1,189	1,196	1,245	1,178	1,066		*2 (1,274)
Production*1 ('000 t)	1,189	1,292	1,413	1,330	1,215	1,400 1,600	*3 (459)
Lint Production ('000 t)	*2 (433) 429	(484) N.A.	(526) N.A.	(458) 499	(461) 460	504 776	400 (3%) 600 (1%)

Domestic consumption is estimated as follows based on the above lint production and imports.

('000 tons)

	Actual					Forecast 2000	
	1978	1979	1980	1981	1982	ENTS III	NPFT
Production	438	484	528	498	461		400 600
Export (Lint)	225	–	187	123	144	160 120	20 100
Consumption	213	484	341	375	317		400 535

Assuming that production and consumption in 2000 will be maintained at the average volume of the past three years, production, consumption and export are estimated as 496 x 10^3 tons, 344 x 10^3 tons and 152 x 10^3 tons, respectively.

(10) Rice

The past performance of rice production according to the CAPMAS Statistical Yearbook and the future estimates are presented in the following table.

('000 tons)

	Actual					Forecast 2000	
	1978	1979	1980	1981	1982	ENTS III	NPFT
Cultivated Area	1,031	1,040	972	756	1,026		
Production*1	(1,345) 2,351	(1,400) 2,511	(1,304) 2,384	(1,279) 2,236	(1,316) 2,441	(1,676) (1,305)	2,574(2%)*2 4,500(5%)
Export	144	67	*(37) 192	107	*(26) 31	△ 250 △ 127	163 △ 296
Consumption	1,201	1,369	1,327	1,272	1,370	1,972 1,923	2,370

Note: *1: Production in the Statistical Yearbook is on a paddy base and it was converted to a white rice base using a conversion factor of 0.572 based on ENTS II.

*2: NPFT value seems to be lower on a paddy base and higher on a white rice base. (Production 1,750 x 10^3 tons and consumption 1,643 x 10^3 tons in 1981)

Assuming that per capita consumption is 31 kg which is the average of the past five years, future consumption in 2000 is estimated as 2,093 x 10^3 tons.

The past performance of rice production remained nearly constant during the past five years. Under the assumption of an annual production increase of 2%, future production is estimated as 1,994 x 10^3 tons in 2000 and imports are estimated as 99 x 10^3 tons.

(11) Sugar

The past performance of sugar production according to the CAPMAS Statistical Yearbook and the future production estimates are given in the following table.

('000 tons)

	Actual					Forecast 2000	
	1978	1979	1980	1981	1982	ENTS III	NPFT
White Sugar	344	345	360	373	377		
Refined Sugar	286	272	256	246	222		
Total	630	317	616	619	599	985 1,135	1,192 (3%) 1,600 (9-3%)

Production of sugar levelled off at 600 x 10^3 tons during the past several years because of the limited capacity of existing plants. The future plan of sugar production is reported as follows in ENTS III:

Total capacity 1,057 x 10^3 tons

(including expansion of Kous and Deshna, a new plant of 150 x 10^3 tons at Gerga, and a new plant of 100 x 10^3 tons at Kafr El Sheikh)

Domestic consumption is estimated as follows based on the above-mentioned production and the imported volume according to Port Authorities.

('000 tons)

	Actual					Forecast 2000	
	1978	1979	1980	1981	1982	ENTS III	NPFT
Production	630	617	616	619	599		1,192 1,600
Import	(317) 362	(176) 176	(466) 473	(626) 654	(731) 731	1,295 1,545	1,229 820
Consumption	947	793	1,082	1,245	1,330	2,280 2,680	2,420 (4%)
Ref.) Population	39,767	40,889	42,126	43,465	44,673		

Per capita consumption is estimated as 25 ~ 30 kg from the above table. The income elasticity of sugar consumption is around 0.4 in industrialized countries. Therefore, in 2000 per capita consumption is estimated to be 42 kg and total consumption to be 2,902 x 10^3 tons.

Estimated imports are 1,845 x 10^3 tons, considering the above-mentioned estimated production of 1,057 x 10^3 tons.

(1,000 LE)

	1978	1979	1980	1981	1982	2000
GDP/Cap. at 81/82 Prices (fact. cost)	0.344	0.366	0.407	0.450	0.469	1.098

(12) Paper/Pulp

The CAPMAS Statistical Yearbook reported past paper production as presented below. However, these data show the decline of both consumption and production and seem to be inaccurated. Since there is no other available data at present, the NPFT value was applied in this report.

('000 tons)

	Actural							Forecast 2000	
	1978	1979	1980	1981	1982	1983	1984	ENTS III	NPFT
Production	165	169	191	124	147	153	161		
Import	153	N.A.	18	48	–	N.A.	N.A.	185	650
Consumption	318	N.A.	209	172	147				

(13) Timber

The past imports and estimated future imports of timber are listed in the following table.

('000 tons)

	Actual					Forecast 2000	
	1978	1979	1980	1981	1982	ENTS III	NPFT
Timber	667	541	1,101	1,004	1,065	3,407 4,915	1,600 (2%) 2,000 (3%)
GDP at 81/82 Prices, (Construction + Industry) (fact.cost)	2,772	3,004	3,370	3,579	3,836		

The future imports of timber are estimated as 7,034 x 10^3 tons in 2000.

$y = 0.225x - 407.7$ ($R = 0.854$)

y : Volume of Timber Imports ('000 t)

x : GDP of the Construction and Industrial Sectors (million LE at 81/82 prices (factor cost))

(14) Iron & Steel Products

The past performance of production of iron & steel products according to the Statistical Yearbook and future estimates are presented below.

('000 tons)

	Actual					Forecast 2000	
	1978	1979	1980	1981	1982	ENTS III	NPFT
Steel Billets & Steel Sections	145	145	188	272	304		
Steel Sheets	41	50	61	61	57		
C.I. Products	66	119	199	100	113		
Reinforcing Steel	261	298	289	297	293		
Nails	9	9	10	10	12		
Wires	18	22	20	20	25		
Total	540	643	767	760	804	3,300 3,800	5,240 5,250

The ENTS III revised production forecast is as follows:

	1987	1992		2000	
		Low	High	Low	High
Helwan	1.3	1.4	1.5	2.2	2.2
Abu Zaabal	0.2	0.2	0.2	0.2	0.2
El Dikheila	0.1	0.7	0.8	0.9	1.4
Total	1.6	2.3	2.5	3.3	3.8

However, considering the progress of Beheila and Dikheila, the revised forecast seems to be too low.

Therefore, the NPFT value is applied in this study.

Consumption is estimated from the past performance of production and data on imports provided by port authorities as follows.

('000 tons)

	Actual					Forecast 2000	
	1978	1979	1980	1981	1982	ENTS III	NPFT
Production	540	643	767	760	804	3,300 3,800	5,260 5,250
Import	(20) 716	– 650	(17) 1,062	(6) 769	(1) 907	2,200 3,600	1,300 3,900
Consumption	1,236	1,239	1,812	1,523	1,710	5,500 7,400	6,540 9,150

Future consumption is estimated as follows:

$y = 0.223x + 234.1$ ($R = 0.812$)

y : *Consumption ('000 tons)*

x : GDP of Construction and Industrial Sectors.

Consumption in 2000 is $7,599 \times 10^3$ tons.

Therefore, future imports are estimated as $2,349 \times 10^3$ tons.

(15) Heavy Equipment and Cars

The past performance and future estimates of exports and imports are as follows:

('000 tons)

	Actual					Forecast 2000	
	1978	1979	1980	1981	1982	ENTS III	NPFT
Import	200	202	429	246	253	No estimation	1,000
Export	30	36	31	34	24		50

Source: Data from Port Authorities.

The NPFT value is applied in this study.

(16) Food & Agricultural Goods

The past performance and future forecast of imports and exports are as follows:

('000 tons)

	Actual					Forecast 2000	
	1978	1979	1980	1981	1982	ENTS III	NPFT
Impott	735	91	416	822	570	1,258 1,493	1,400 1,958
Export	375	148	344	178	341	185 865	650

Source: Data from Port Authorities.

The average of the NPFT values is applied in this study.

4.2 Estimation of Necessary Port Facilities

(1) Ataqa-Adabiya

The necessary length of berths is estimated for the commodity groups of general cargo, containerized cargo, grain, coal, dry bulk and special cargo which will be handled at different berths with different cargo handling methods.

Quay depth was set to accommodate the expected maximum ship size which was determined considering the ships currently serving Egyptian ports, the depth of quays in the trading partners' ports and the ships currently serving Japanese ports.

The type of cargo handling equipment and the capacity were determined considering the example of Japanese ports, the master plan of Damietta Port and the master plan of the port of Suez.

Grain Terminal:

1) Expected Conditions

* Cargo throughput 1,462,000 tons (1995)
  2,096,000 tons (2005)

* Maximum ship size

Egypt will continuously import wheat from Australia. According to the statistics in "World Bulk Trade" (Fernleys 1981), 82% of the grain exported from Australia was carried by vessels less than 40,000 DWT, 12% by vessels between 40,000 DWT and 60,000 DWT and 6% by vessels between 60,000 DWT and 80,000 DWT.

It is probable that transport of grain between Australia and Suez will be carried out on a charter basis with shuttle service, and that vessels will return to Australia empty.

Considering these conditions, the probable ship size is considered to be 50,000 DWT.

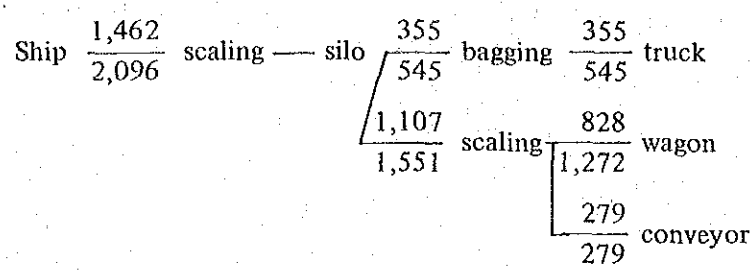
However, on an economic base, 80,000 DWT, which is currently the maximum size ship carring grain from Australia, is profitable between comparison of costs as follows:

50,000 DWT	Transport cost/ton =	= 17.8 LE
	Construction cost/ton	= 0.4 LE
	Total cost/ton	= 18.2 LE
80,000 DWT	Transport cost/ton	= 13.7 LE
	Construction cost/ton	= 0.5 LE
	Total cost/ton	= 14.2 LE

Therefore, in this study the maximum ship size is set as 80,000 DWT.

* Cargo flow

According to the comments of MOSHT, the expected cargo flow is as follows:



(upper figures are for 1995 and lower figures are for 2005: in '000 tons)

2) Grain Berth

Average stay of ship	2.9	days/ship
Unloader	600	t/hr x 2
Work time	18	hrs/day
Available work days	300	days/year

Estimated number of berths

$$\eta\ 1995 = \frac{N \cdot d}{S \cdot \alpha \cdot D} = \frac{1{,}462{,}000 \times 2.9}{50{,}000 \times 0.6 \times 330} = 0.43$$

$$\eta\ 2000 = \frac{N \cdot d}{S \cdot \alpha \cdot D} = \frac{2{,}096{,}000 \times 2.9}{50{,}000 \times 0.6 \times 330} = 0.61$$

Therefore, 1 grain berth will be necessary.

The expected berth occupany rate is 0.27 in 1995 and 0.37 in 2005.

3) Silo Capacity

Since the distribution system is not clear at present, silo capacity is designed in the following two ways.

1. Assuming a discharge rate of 35 times/year which means once every 9 days

$$V\ 1995 = \frac{1{,}462{,}000 \times 1.3}{35 \times 0.8} = 67{,}000 \fallingdotseq 70{,}000$$

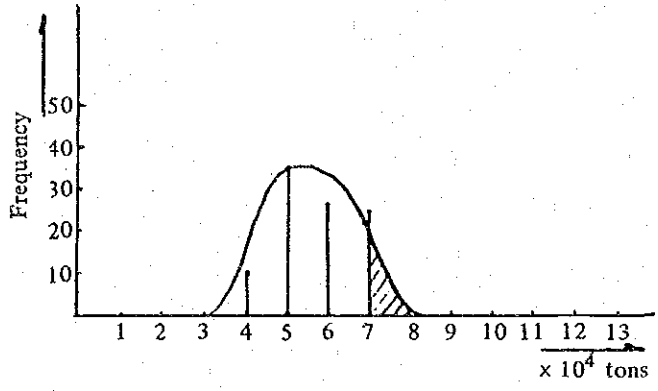
$$V\ 2005 = \frac{2{,}096{,}000 \times 1.3}{35 \times 0.8} = 97{,}300 \fallingdotseq 100{,}000$$

2. Digital simulation

- o Discharge is assumed as daily
- o Average volume of 50,000 t unloaded per ship
- o Probable arrival of ships is a maximum of 2 days fluctuation from the scheduled time.

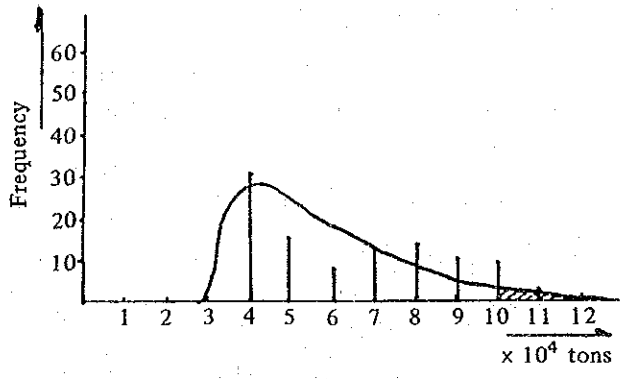
Case-1 1995

- Discharge : 4200 t/day
- Average interval of arrival : 12.5 days
- Discharge of peak stock is shown in the following figure : 95% value is 70,000 t.



Case-2 2005

- Discharge : 6300 t/day
- Average interval of arrival : 9 days
- Discharge of peak stock is shown in the following figure : 95% value is 10,000 t.



Considering the above results, the silo capacity is designed as 70,000 t in 1995 and 100,000 t in 2005.

Coal Berth:

1) Expected Conditions

Cargo throughput	1,248,000 tons (1995)
	2,001,000 tons (2005)
Ship size	50,000 DWT
Average load	50,000 tons
Work time:	18 hrs/day
Unloader	500 t/hr x 2
Average stay	

$$D_{max} = \frac{50,000}{500 \times 2 \times 18 \times 0.6} + 0.5 = 5.1 \text{ days}$$

2) Estimated number of berths

$$\eta\ 1995 = \frac{1,248,000 \times 5.1}{50,000 \times 0.4 \times 330} = 0.96$$

$$\eta\ 2005 = \frac{2,001,000 \times 5.1}{50,000 \times 0.4 \times 330} = 1.55$$

Therefore 1 coal berth in 1995 and 2 coal berths in 2005 will be necessary. The expected berth occupancy rate is 0.39 in 1995 and 0.31 in 2005.

3) Necessary Area for Stock Yard

$$S = \frac{1,248,000}{10} = 124,800 \text{ t (Stock volume)}$$

Density:	0.7 t/m^3
Angle of repose:	40°
Pile width x height:	40 m x 15 m
Number of piles:	3

Volume per pile is $124,800/3 \times 0.7 = 59,429$ m^3

Pile length is $\frac{59,429}{15 \times (40 - 17.9)} = 17.9 = 197$ m

Therefore the necessary stock area is more than 28,000 m^2.

General Cargo Berth:

1) Expected Conditions

Cargo throughput	800,000 tons (1995)
	930,000 tons (2005)
Ship size	20,000 DWT
Average load	1,500 tons/vessel
Average stay	2.6 days
Available work days	330 days/year

2) Estimated Number of Berths

$$\eta\ 1995 = \frac{800{,}000 \times 2.6}{1{,}500 \times 0.7 \times 330} \fallingdotseq 6.0$$

$$\eta\ 2005 = \frac{930{,}000 \times 2.6}{1{,}500 \times 0.7 \times 330} \fallingdotseq 7.0$$

Therefore 6 general cargo berths in 1995 and 7 general cargo berths in 2005 will be necessary.

The expected berth occupancy rate is 0.7 both in 1995 and in 2005.

3) Necessary Area for Transit Sheds

$$S = \frac{N \cdot r}{R \cdot \alpha \cdot w}$$

where N: Cargo volume through transit shed
r : Peak ratio
R: Turnover
w: t/m^2

$$S\ 1995 = \frac{478{,}200 \times 1.3}{25 \times 0.7 \times 2.0} = 17{,}762\ m^2$$

$$S\ 2005 = \frac{558{,}000 \times 1.3}{25 \times 0.7 \times 2.0} = 20{,}726\ m^2$$

$$S\ 1995 = \frac{239{,}100 \times 1.3}{25 \times 0.6 \times 2.0} = 10{,}361\ m^2$$

$$S\ 2005 = \frac{279{,}000 \times 1.3}{25 \times 0.6 \times 2.0} = 12{,}090\ m^2$$

Therefore, 2 transit sheds each of which is 140 m x 45 m will be necessary. (30% of total voluem is assumed to be stocked).

4) Necessary Area for Open Yards

$$S\ 1995 = \frac{478{,}200 \times 1.3}{2.5 \times 0.7 \times 2.0} = 17{,}762\ m^2$$

$$S\ 2005 = \frac{558{,}000 \times 1.3}{25 \times 0.7 \times 2.0} = 20{,}726\ m^2$$

Therefore, more than 21,000 m^2 will be necessary.

Special Cargo Berth:

1) Expected Conditions

Cargo throughput:	309,000 tons (1995)
	585,000 tons (2005)
Ship size:	20,000 DWT
Average load:	10,000 tons
Average stay:	2.9 days
Available work days:	330 days/year

2) Estimated Number of Berths

$$\eta\ 1995 = \frac{309{,}000 \times 2.9}{10{,}000 \times 0.5 \times 330} = 0.54$$

$$\eta\ 2005 = \frac{585{,}000 \times 2.9}{10{,}000 \times 0.5 \times 330} = 1.03$$

Therefore, 1 berth in both 1995 and 2000 will be necessary.

The expected berth occupancy rate is 0.27 in 1995 and 0.51 in 2005.

3) Necessary Area for Open Yards

Timber: $V\ 1995 = \frac{90{,}000}{10} = 9{,}000\ m^2$

$$V\ 2005 = \frac{215{,}000}{10} = 21{,}500\ m^2$$

Others: $A\ 1995 = \frac{219{,}000}{20 \times 0.5 \times 2} = 10{,}950\ m^2$

$$A\ 2005 = \frac{370{,}000}{20 \times 0.5 \times 2} = 18{,}500\ m^2$$

Therefore more than 28,500 m^2 will be necessary.

Bulk Cargo Berth:

1) Expected Conditions

Cargo throughput:	767,000 tons (1995)
	1,165,000 tons (2005)
Ship size:	20,000 DWT
Average load	10,000 tons
Average stay	5 days
Available work days:	330 days/year

2) Estimated Number of Berths

$$\eta\ 1995 = \frac{767{,}000 \times 5}{10{,}000 \times 0.6 \times 330} = 1.9$$

$$\eta\ 2005 = \frac{1{,}165{,}000 \times 5}{10{,}000 \times 0.6 \times 330} = 2.9$$

Therefore, 2 berths in 1995 and 3 berths in 2005 will be necessary.

The expected berth occupancy rate is 0.58 in 1995 and 0.59 in 2005.

3) Necessary Area for Open Yards

$$A\ 1995 = \frac{767{,}000}{25 \times 0.7 \times 2} = 21{,}914\ m^2$$

$$A\ 2005 = \frac{1{,}165{,}000}{25 \times 0.7 \times 2} = 33{,}257\ m^2$$

Therefore more than 33,257 m^2 will be necessary.

Container Terminal:

1) Expected Conditions

Cargo throughput:
Import 179,000 t
Export 35,000 t } (1995)
Import 420,000 t
Export 195,000 t } (2005)

Number of containers: 35,800 TEU (1995)
84,000 TEU (2005)

Ship size: 12,000 DWT semi-container ship with 2 derrick cranes up to 1995
30,000 DWT container ship with 1 shore crane up to 2005

2) Estimated Number of Berths

$$\eta\ 1995 = \frac{35{,}800}{2 \times 9\ \text{TEU/h} \times 14\ \text{h/day} \times 330 \times 0.4} = 1.08$$

$$\eta\ 2005 = \frac{84{,}000}{1 \times 20\ \text{TEU/h} \times 21\ \text{h/day} \times 330 \times 0.4} = 1.52$$

Therefore 1 berth in 1995 and 2 berths in 2005 will be necessary.

3) Necessary Area for Marshalling Yard and Freight Station, etc.

The necessary area will be 350 m x 300 m considering future conditions where full container ships will be served.

2.2 Ain Sukhna

Coal Berth:

1) Expected Conditions

Cargo throughput: 1,830,000 tons
Ship size: 50,000 DWT
Average load: 50,000 tons
Work hours: 24 hrs/day
Average stay: $Q_m = \frac{50{,}000}{500 \times 2 \times 24 \times 0.4} + 0.5 = 5.7$

2) Estimated Number of Berths

$$\eta = \frac{1{,}830{,}000 \times 5.7}{330 \times 0.4 \times 50{,}000} = 1.58$$

Therefore, 2 berths will be necessary.
The expected berth occupancy rate is 0.32.

Iron Ore Berth:

1) Expected Conditions

Cargo throughput:	4,140,000 tons
Ship size:	100,000 DWT
Cargo handling capacity:	2,500 tons/hr
Work time:	18 hrs/day
Average stay	3.2 days

2) Estimated Number of Berths

$$\eta = \frac{4{,}140{,}000 \times 3.2}{100{,}000 \times 0.4 \times 330} = 1.0$$

Therefore 1 berth will be necessary.
The expected berth occupancy rate is 0.4.

Oil Berth:

1) Expected Conditions

Cargo throughput:	900,000 tons
Ship size:	3,000 DWT
Cargo handling capacity:	100 tons/hr
Work tiem:	18 hrs/day
Average stay:	2.7 days

2) Estimated Number of Berths

$$\eta = \frac{900{,}000 \times 2.7}{3{,}000 \times 0.6 \times 330} = 4.1$$

Therefore 4 berths will be necessary and the expected berth occupancy rate is 0.61.

Foreign Trade General Cargo Berth:

1) Expected Conditions

Cargo throughput:	792,000 tons
Ship size:	20,000 DWT
Average load:	1,500 tons/vessel
Average stay:	2.6 days
Available work days:	330 days/year

2) Estimated Number of Berths

$$\eta = \frac{792{,}000 \times 2.6}{1{,}500 \times 330 \times 0.7} = 5.9$$

Therefore 6 berths will be necessary and the expected berth occupancy rate is 0.69.

Domestic Trade Bulk Berth:

1) Expected Conditions

Cargo throughput:	1,137,000 tons
Ship size:	3,000 DWT
Cargo handling capacity:	1,330 t/m/year

2) Estimated Number of Berths

$$\eta = \frac{1,137,000}{1,330} = 855$$

$$\frac{855}{105} = 8.1$$

Therefore 8 berths will be necessary.

Domestic Trade General Cargo Berth:

1) Expected Conditions

Cargo throughput:	147,000 tons
Ship size:	3,000 DWT
Cargo handling capacity:	670 t/m/year

2) Estimated Number of Berths

147,000/670 = 219

219/105 = 2.1

Therefore 2 berths will be necessary

Iron & Steel Products Berth:

1) Expected Conditions

Cargo throughput:	800,000 tons
Ship size:	3,000 DWT
Work time:	18 hrs/day
Cargo handling capacity:	150 t/hr
Average stay:	1.6 days/vessel

2) Extimated Number of Berths

$$\eta = \frac{800,000 \times 1.6}{3,000 \times 0.6 \times 330} = 2.15$$

Therefore 2 berths will be required.