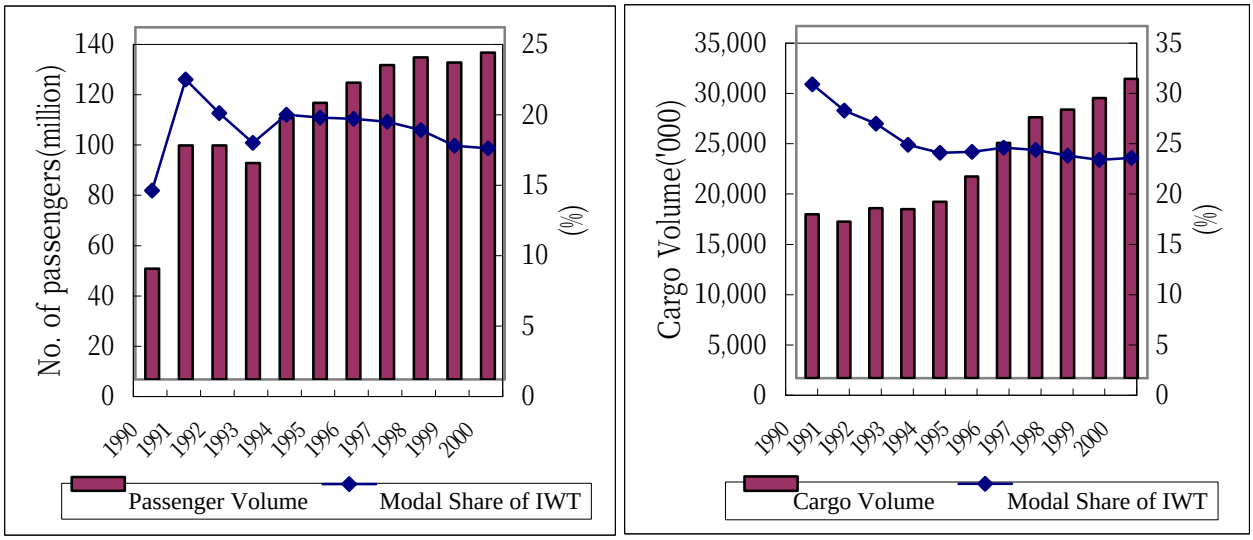
Chapter 6 Current IWT Demand Characteristics

6.1 Historical trend of IWT demand

6.1.1 Nationwide IWT demand

Viet Nam has 2,360 rivers and channels with a total length of 41,900 km of which 11,226 km have sufficient depth for inland waterway transport (IWT). Although modal share has been declining, IWT has played an important role in transporting cargoes. Accurate data on transport demand of inland waterway are difficult to obtain, but scattered data are available from past studies and relevant government agencies. Existing statistics are, however, considered unreliable due to an unreliable methodology in collecting and compiling data. Nevertheless, the general features of IWT can be taken as follows:

- Although the transport volume of inland waterway has been steadily increasing, its modal share has been decreasing. The relatively high share of IWT is seen in the Mekong and Red River delta regions.
- Compared to passenger transport, inland waterway has more importance in carrying bulk cargoes especially coal, cement and other construction materials.
- Only a few passengers use inland waterway, mainly because most inland waterways are limited to the delta areas and only serve intra-provincial movement[1].



Source) GSO, "Statistical Yearbook", 2000

Figure 6.1.1 Transport Demand and Modal Share of Inland Waterway in Vietnam

[1] As of 2000, the average trip length was 106 km for cargo transport but 14 km only for passenger transport.

Although transport demand of inland waterway was recorded at 29.7 million tons as of 2000 in terms of cargo transport as shown in **Figure 6.1.1**, actual transport demand is said to be much higher since it did not reflect transport demand by individuals and nonmotorized boats. According to VIWA, transport demand reached about 33 million tons.

6.1.2 IWT demand in the North

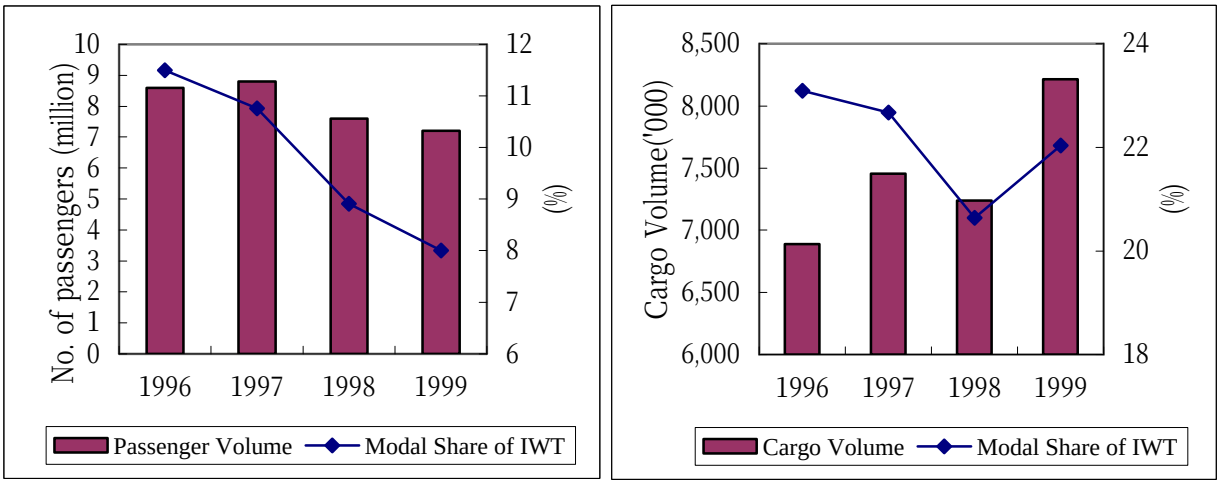
In the north, there are three river systems: Red River, Thai Binh River and Ma River. The Red River and Thai Binh River are the two major river systems and are mainly linked together by Duong and Luoc rivers. Both make a convenient waterway network. The outline of the river system in the north is summarized in **Table 6.1.1**.

Table 6.1.1 Outline of the River System in the North

River	Length (km)	Basin Area (km^2)
Red River	651	61,400
Thai Binh River	185	12,000
Ma River	415	17,600

Source) VITRANSS, 2000

The river system in the north is mostly natural and greatly affected by hydrometeorological elements. The inland waterway via this river system has some features, eg strong water current during rainy season and limited navigability and curving radius of channel during dry season. Sandbanks often form, which sometimes make navigation difficult. However, inland waterway transportation has been regarded as an important transport means for a long time with its lower transportation cost especially for long distances and heavy and bulky cargoes. Despite this advantage, both its transport volume and modal share continued to decline. The decline was particularly alarming in 1998 when, in spite of the regional economic crisis, cargo transport through other modes substantially grew. This is due probably to the comparatively improved condition of the road network. However, as some specialized plants along inland waterways in the north are planned, the importance of IWT in carrying bulk cargoes would be strengthened.



Source) TDSI

Figure 6.1.2 Transport Demand and Modal Share of Inland Waterway in the North

In 1999, cargo volume transported via inland waterways in the north was recorded at 8.2 million tons and 1.6 billion ton-km as of 1999, the modal shares of which account for 22.0% and 49.5%, respectively, as shown in **Table 6.1.2**. These figures show the importance of inland waterway in the transport sector in the north especially in terms of ton-km. On the contrary, inland waterways play a minor role in transporting passengers in the north and its shares account for 8.0% of passenger volume and 3.0% of passenger-km, both of which are lower than the national average.

Table 6.1.2 Transport Demand in 1999

	Cargo Transport					
	ton('000)			ton-km(million)		
Region	Total	IW	% Share	Total	IW	% Share
Whole Country[1/]	128,404	27,843	21.7	37,388	2,970	7.9
Red River Delta	27,562	6,774	24.6	1,858	1,142	61.5
North East & West	9,728	1,443	14.8	1,392	466	33.5
Total of North	37,290	8,217	22.0	3,250	1,608	49.5
	Passenger Transport					
	no. of passenger(million)			passenger-km (million)		
Region	Total	IW	% Share	Total	IW	% Share
Whole Country	760	126	16.6	21,325	1,777	8.3
Red River Delta	64	4	5.6	1,879	38	2.0
North East & West	26	4	13.9	1,392	60	4.3
Total of North	90	7	8.0	3,271	97	3.0

Note) 1/ including maritime transport.

Source) GSO, "Statistical Yearbook", 2000

6.1.3 Demand elasticity

In general, transport demand has a strong correlation with economic activities. As economy develops, transport demand increases. This is usually called demand elasticity[2]. Transport demand of inland waterway and Vietnamese economy has increased at the following average annual growth rate:

	1991-1995	1995-2000	1991-2000
National GDP[1/]	8.79%	6.94%	7.76%
Cargo Transport	6.53%	8.22%	7.47%
Passenger Transport	4.35%	3.47%	3.86%

Note: 1/ at constant 1994 prices, GSO, "Statistical Yearbook", 2000

Therefore average value of the demand elasticity for the past years was as follows:

	1991-1995	1995-2000	1991-2000
Cargo Transport	0.74	1.18	0.96
Passenger Transport	0.50	0.50	0.50

These values reveal that during the period 1991-2000 the elasticity of cargo transport was much higher than that of passenger transport and the elasticity of passenger transport was constant, whereas that of cargo transport increased. Regarding cargo transport, the elasticity values were almost the same as those proposed by the MOTC[3]. Another study, the "Red River Waterways Projects Viet Nam (ADB, 1998)" anticipated that the demand elasticity starting at 0.8 between 1995-2001 would gradually decline up to about 0.4 between 2001–2016. As a result, the growth rate of inland waterway cargo transport would become 6–3%. But empirical evidences showed that the Study's assumption for the period 1996-2000 was lower than the actual. Even though it is clear that the values of elasticity will decline in the future, they are expected to be higher than ADB's assumptions. In the "Master Plan of Inland Waterway in Viet Nam to the Year 2020 (VIWA, 2000)", by contrast, the elasticity values were estimated at 1.15 for cargo transport and

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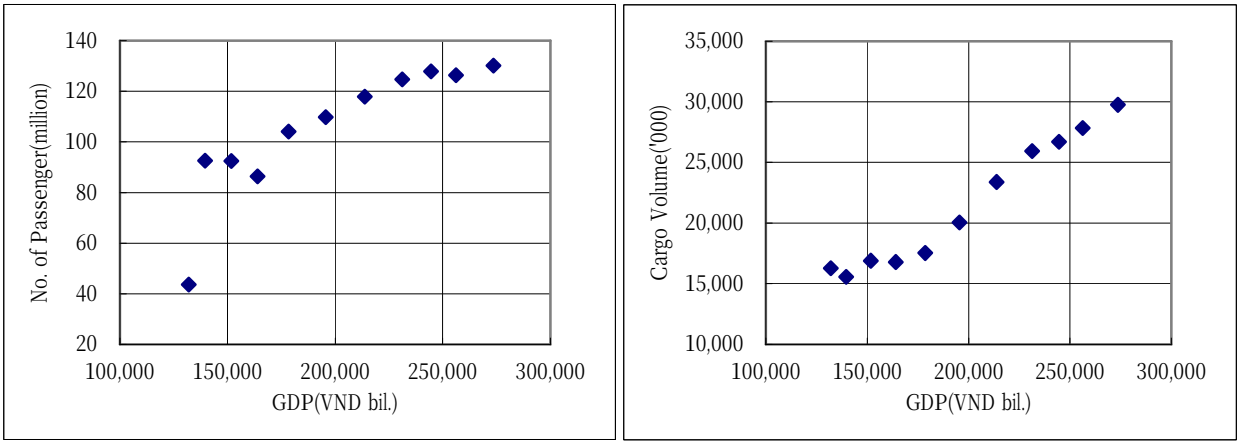
[2] If the growth rate of GDP is 10% and transport demand increases by 15%, the demand elasticity becomes 1.5.

[3] In the "Master Plan for the Development of Transport Infrastructure to the Year 2010", MOTC adopted the following values of elasticity.

- Total goods transport 1.0 – 1.1
- Road transport 1.2 – 1.4
- Rail transport 0.6 – 0.8
- Inland waterway transport 0.7 – 0.9

0.84 for passenger transport and were used to forecast future IWT demand. These values are somewhat higher than international averages but they would become low in the future based on other countries' experiences and the continuing increase of road transport's role. Judging from the historical change in IWT demand and other countries' experiences, the values of elasticity are expected to fall between ADB's and VIWA's assumptions.



(a) Passenger transport (b) Cargo transport

Figure 6.1.3 Relation of GDP and IWT Demand

6.2 Transport demand at ports and on rivers

6.2.1 Cargo throughput at ports

Inland waterway ports are classified into three groups according to management as follows:

- 1st group : ports managed at central level, which include the ports of Hanoi, Viet Tri, Hoa Binh, Ninh Binh and Ha Bac;
- 2nd group : ports managed at local level, which include the ports of Tuyen Quan, Son Tay, Hong Cau, Cong Cau, Ta Hoc, An Duong, etc.; and
- 3rd group : special ports handling specific commodity items, eg thermal power plants, cement, food grains, papers, building glass, etc., which include Pha Lai and Ninh Binh (thermal power plants), Chinh Phong and Hoang Thach (cement), Bai Bang (paper), Dap Cau (glass), Chem (construction materials), etc.

As the inland waterway ports above listed are generally small and poorly operated and managed, reliable data on transport demand cannot be easily obtained. Data collection was done instead through an interview survey by the TDSI.

Figure 6.2.1 Location of Major Inland Waterway Ports in the North

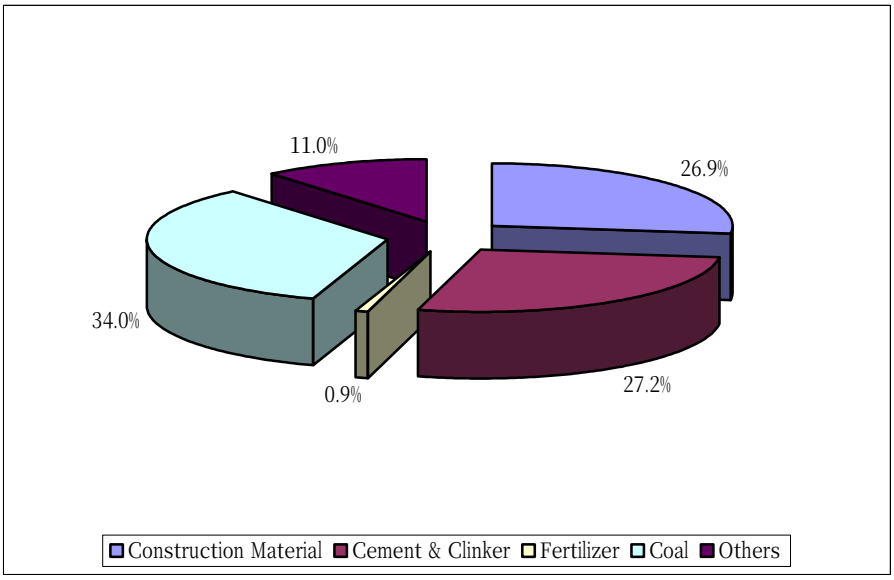


Figure 6.2.2 Cargo Throughput Structure in the North

New data on cargo throughput are found in **Table 7.1.3**. Cargo items handled at each port strongly reflect the natural resources, industries and social condition of neighboring areas. Total cargo throughput was estimated at 16.2 million tons which is twice than the figure in the GSO's statistical yearbook. Future transport demand of inland waterway was forecast taking into account new data on cargo throughput. Cargoes loaded/unloaded at major ports are, as shown in **Figure 6.2.2**, dominated by coal (34.0%), cement and clinker (27.2%) and construction materials (26.9%).

6.2.2 Transport demand on rivers

In the Red River Delta, although there are many transport routes via inland waterways, the more important and indispensable inland waterway routes are as follows:

- Quang Ninh – Ninh Binh route passing through Luoc, Dao and Day rivers;
- Quang Ninh – Hanoi – Viet Tri passing through Kinh Thay, Duong and Hong rivers;
- Lach Giang – Nam Dinh – Hanoi passing through Ninh Co and Hong rivers; and
- Cua Day – Ninh Binh passing through Day River.

Transport demand data on these routes were obtained by estimating origin-destination (OD) traffic and assigning it on the routes. The results were then compared with those of relevant past studies, selecting some inland waterway stretches for comparison (see **Figure 21.1.1**). The transport demand assigned on these stretches is listed in **Table 6.2.1** and illustrated in **Figure 6.2.3**. In general, more cargo volume is found on the Quang Ninh – Hanoi and Quang Ninh – Ninh Binh routes.

Table 6.2.1 Transport Demand on Major Inland Waterway Routes

(Unit: million tons/year)

No.	River	JICA[1/]	ADB[2/]	VIWA[3/]	No.	River	JICA[1/]	ADB[2/]	VIWA[3/]
1	Chanh	8.3	4.30	5.10	18	Red	0.2	0.20	-
2	Bach Dang	4.4	2.40	3.20	19	Da	0.1	0.20	0.45
3	Da Bach	4.5	2.30	3.20	20	Lach Tray	2.4	1.40	4.30
4	Mao Khe	0.5	0.40	1.10	21	Thai Binh	2.5	1.30	-
5	Mao Khe	1.1	0.07	1.10	22	Luoc	2.5	1.40	2.40
6	Phi Liet	4.0	1.90	3.00	23	Red	3.0	2.00	1.20
7	Bach Dang	-	-	-	24	Dao	2.6	1.60	2.00
8	Lach Tray	3.9	2.30	4-6	25	Day	2.6	1.60	2.00
9	Cam	1.7	0.60	0.80	26	Day	0.6	-	-
10	Han	5.6	3.00	2.90	27	Day	0.6	-	0.07
11	Kinh Thay	6.8	3.20	4.00	28	Ninh Co	0.1	-	-
12	Kinh Thay	6.5	3.20	4.00	29	Ninh Co	0.1	0.00	0.12
13	Thai Binh	4.7	1.40	3.20	30	Red	0.1	0.40	-
14	Thai Binh	0.9	0.40	0.80	31	Tra Ly	0.3	0.40	0.80
15	Duong	3.1	2.00	1.80	32	Red	0.7	0.70	0.80
16	Red	4.7	2.30	3.10	33	Red	3.1	1.40	0.80
17	Lo	4.5	1.80	2.30					

Note) 1/ "The Study on the Red River Inland Waterway Transport System", JICA, 2002.
2/ "Red River Waterways Project Viet Nam", ADB, 1998
3/ "Master Plan of Inland Waterway in Viet Nam to the Year 2020", TDSI&VIWA, 2000

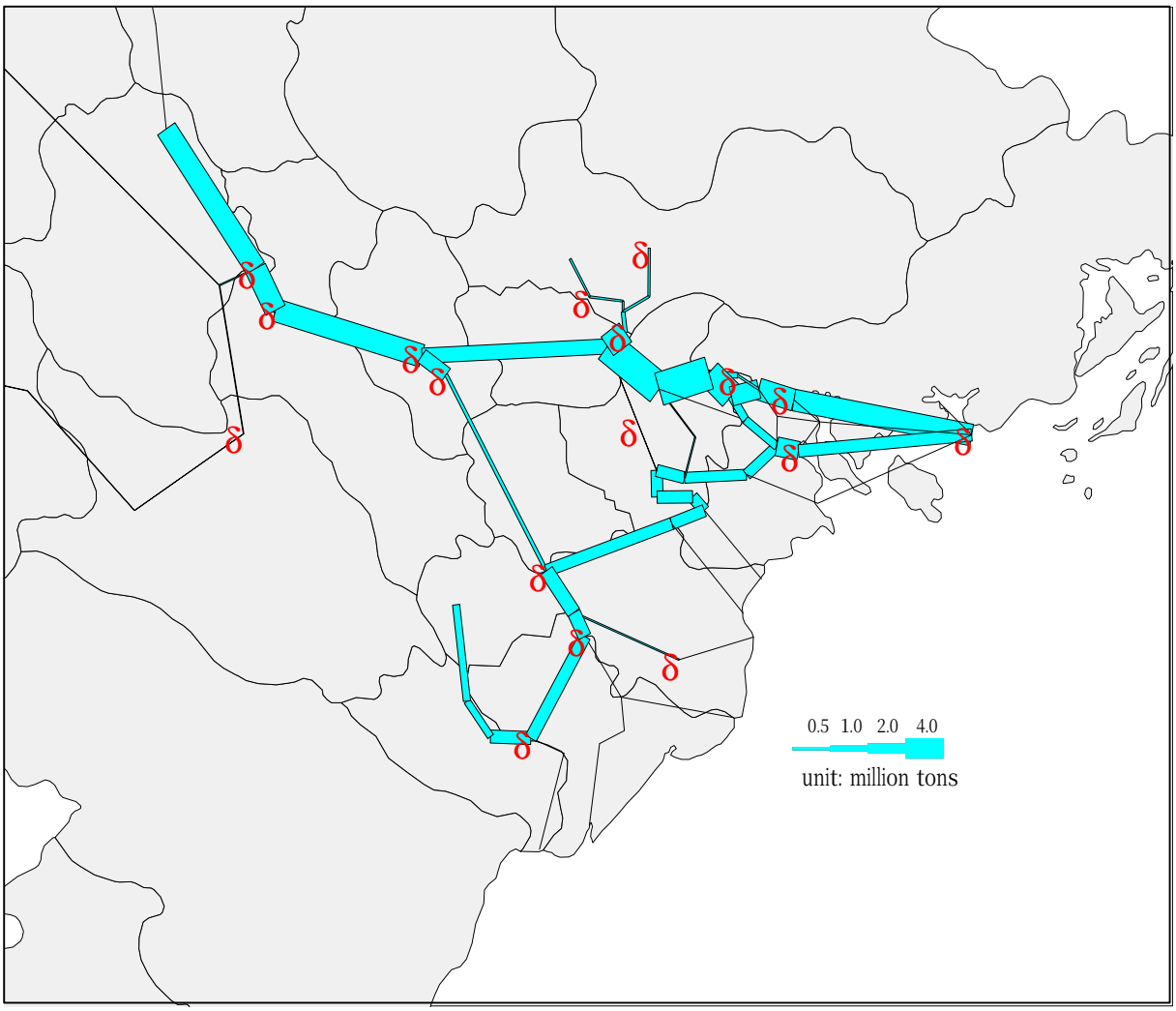


Figure 6.2.3 Major Inland Waterway Stretches and Their Traffic

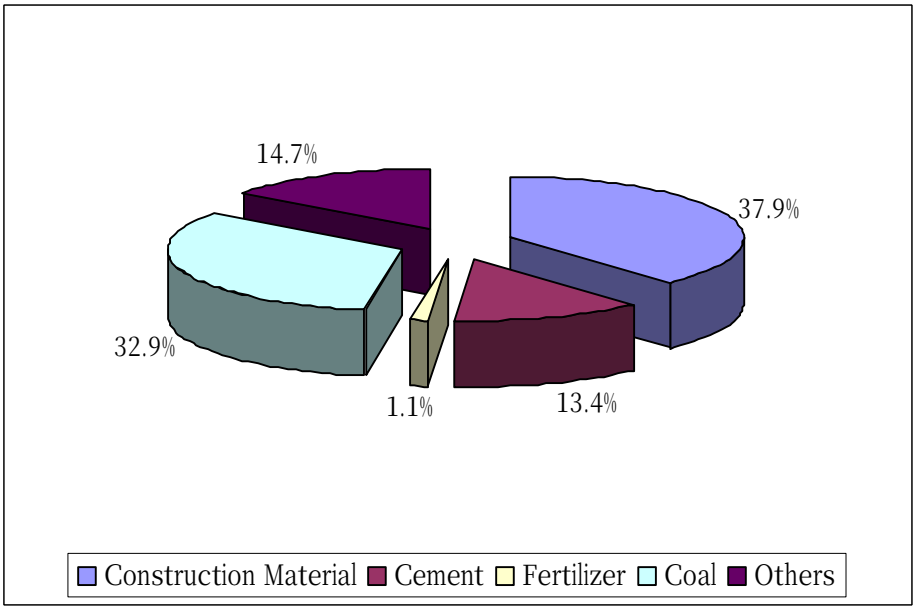
6.3 Region and commodities

6.3.1 Gross output by province

The zoning system was set up based on provincial boundary, although some provinces have more than one depending on the number of their ports. In this sense, cargo gross output of a province can provide a clue to its captured cargo movement. Major cargoes transported through inland waterways in the Red River Delta region are bulk cargoes such as coal, construction materials, cement, and fertilizer. As shown in **Table 6.3.1**, the production of commodity items is largely dependent on certain provinces and the demand of such items by other provinces for their social and economic activities.

6.3.2 Commodities

OD cargo traffic was estimated after revising that estimated in the VITRANSS by taking into account transport demand at every port and on rivers and commodity gross of provinces. Results showed that cargo traffic in the Red River Delta region was dominated by construction materials (37.9%), followed by coal (32.9%) and cement (13.4%).



Note) including inter- and intraprovincial cargo traffic

Figure 6.3.1 Cargo Traffic Structure, 2001

Table 6.3.1 Gross Output, 1999

Region	Province	Stone ('000. m3)	Sand ('000.tons)	Cement ('000.tons)	Fertilizer ('000.tons)	Coal ('000.tons)
Red River Delta	Hanoi	-	-	121	-	-
	Hai Phong	-	-	1,658	-	-
	Vinh Phuc	-	-	-	-	-
	Ha Tay	-	-	116	-	-
	Bac Ninh	-	-	-	-	-
	Hai Duong	1,162	-	1,845	-	-
	Hung Yen	-	-	-	-	-
	Ha Nam	1,001	-	571	-	-
	Nam Dinh	-	-	-	-	-
	Thai Binh	-	-	14	-	-
	Ninh Binh	813	-	100	114	67
	Sub-total	2,976	-	4,425	114	67
North - east	Ha Giang	11	-	32	-	
	Cao Bang	24	48	2,126	-	
	Lao Cai	-	-	31	-	
	Bac Kan	-	93		-	
	Lang Son	410	-	106	-	63
	Tuyen Quang	101	116	86	-	-
	Yen Bai	-	-	51	-	-
	Thai Nguyen	-	232	125	-	402
	Phu Tho	-	?		766	-
	Bac Giang	-	-	22	65	-
	Quang Ninh	458	-			8,806
	Sub-total	1,004	488	2,579	831	9,271
North - west	Lai Chau	21	-	-	-	7
	Son La	-	-	43	-	4
	Hoa Binh	211	157	147	-	5
	Sub-total	232	157	190	-	16
Total		4,212	645	7,193	945	9,353

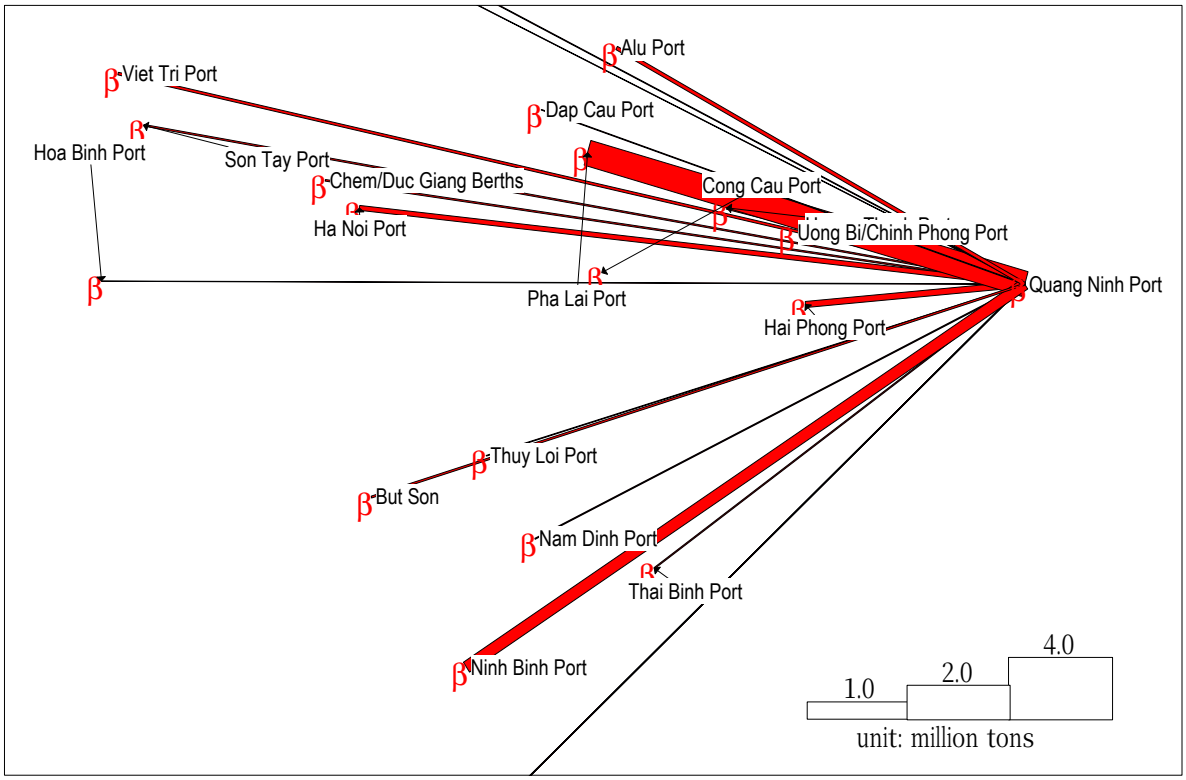
Source) GSO, "Statistical Yearbook", 2000

Based on GSO's statistical data, coal production has steadily increased from 4.6 million tons in 1990 to 9.3 million tons in 1999. Three quarters of exploited coal was dedicated to domestic consumption and the rest was used for export. Of domestic consumption, about 30% was used for thermal power plants, about 11% for cement plants and about 6% for fertilizer plants. Electricity is expected to replace coal as household power source in the future. Industries will also probably rely on fuel oil, diesel and gas. Therefore, a substantial increase in future coal consumption in future cannot be expected. The development plan of industrial plants will have a direct impact on future coal consumption.

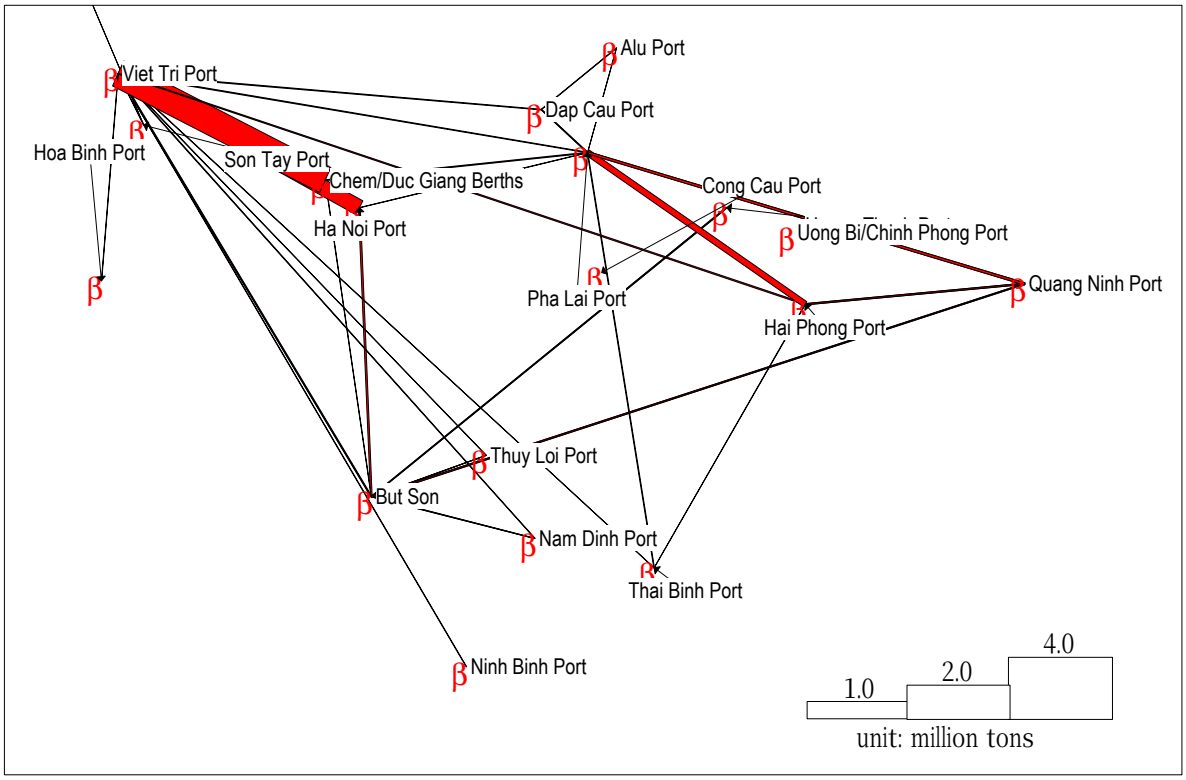
In the north, coal is mostly mined in Quang Ninh and transported to thermal power plants in Pha Lai and Ninh Binh and cement plants in Hai Phong, Hai Duong and Ninh Binh. According to the development plan of industrial plants, Thai Binh and Ha Nam provinces besides those above mentioned will need much amount of coal to satisfy industrial requirements.

The northern delta area around Viet Tri has the richest construction material resources in the whole country. Yellow sand exploited mainly in Phu Tho province is distributed to urban centers like Hanoi and Hai Phong. At the same time, most of northern provinces in the north have deposits of stones. Demand for construction materials has increased.

At present cement is mainly produced in Hai Phong and Hai Duong and is used for both local and international construction needs. The demand for cement and other construction materials has increased. On the other hand, traffic volume of fertilizer by inland waterway transport is not significant.

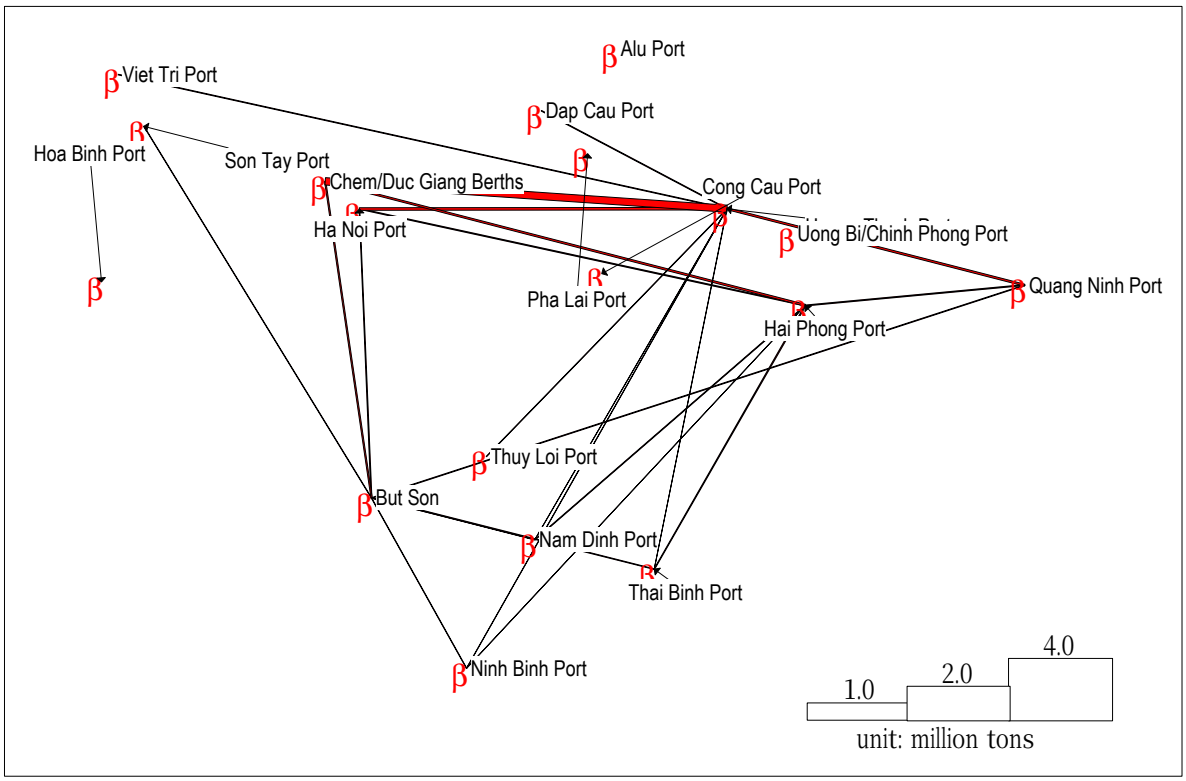


(a) Coal

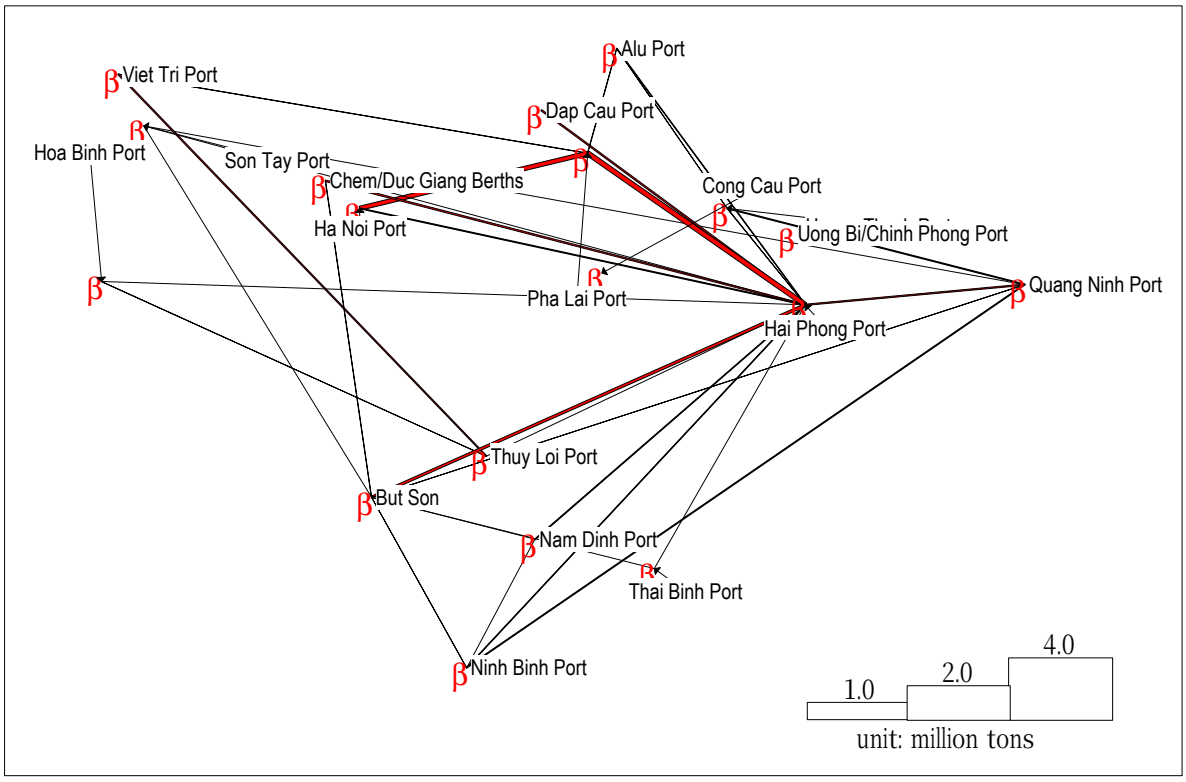


(b) Construction materials

Figure 6.3.2 Port-to-Port Movement, 2001



(c) Cement



(d) Fertilizer

Figure 6.3.2 Continued

6.4 Coastal shipping

6.4.1 Current situation

In Viet Nam, domestic seaborne traffic uses coastal seaways and sea-cum-riverways. It is present in the Red River Delta and the Mekong River Delta, as well as along the country's coastal waters.

The OD data prepared for the "Master Plan Study on Coastal Shipping Rehabilitation and Development Project in Viet Nam" (JICA, 1997) revealed that the domestic seaborne traffic in 1995 was 5.3 million tons: Coastal shipping accounted for 2.7 million tons or 50%, Red River Delta 1.3 million tons or 26%, and the Mekong River Delta 1.3 million tons or 24%.

Domestic seaborne traffic in Red River Delta in 1995 is summarized in **Table 6.4.1**.

Table 6.4.1 Domestic Seaborne Traffic in 1995

Commodity	Coastal Shipping	(%)	Red River Delta	(%)
Agricultural Products	725	26.5	0	0.0
Construction Materials	398	14.6	798	60.2
Wet Cargo	360	13.2	18	1.4
Bulk Cargo	482	17.6	162	12.3
Cement	404	14.8	159	12.0
Other Cargo	363	13.3	159	12.0
Total	2,733	100.0	1,325	100.0

Source) "Master Plan Study on Coastal Shipping Rehabilitation and Development Project", JICA, 1997

(1) Agricultural products

Agricultural products predominantly come from the south to the north. In fact, when there was an acute rice shortage in the north, 600 thousand tons of rice were shipped from the Mekong Delta. Other products from the south include wheat, palm oil, etc.

The north's inherent problems of too many people and insufficient arable land mean that it will always rely on the south for food.

(2) Construction materials and mining products in bulk form

Coal in bulk is shipped from Quang Ninh to many parts, from Viet Tri to the Mekong River Delta area. The biggest unloading port is Ninh Binh where many factories are located.
To accelerate industrialization, abundant coal resources will be fully utilized. Quang Ninh coalfield has good accessibility to the seaport for distribution to central and southern Viet Nam. Fertilizers from phosphate need apatite, which is plentiful around Lao Cai in the northern mountainous area. The north is also endowed with construction materials such as sand and stones. The surplus in the north is shipped to other regions through inland waterways and coastal shipping.

(3) Wet cargo

Compared with foreign trade, domestic wet cargo movement is small but significant. Petroleum products are transported from Nha Be near HCMC to B12 specialized port for petroleum products in Quanh Ninh (Ha Long) to meet the demand in the north.

The distribution pattern of most petroleum products is limited to local markets after the commissioning of the Dung Quat Refinery in central Viet Nam, with coastal shipping carrying most of it.

(4) Bulky products

Hai Phong ships out steel products to various industrial areas including Hanoi, while Ninh Binh has several factories engaged in the production and distribution of fertilizers to the central and the Mekong Delta regions.

A considerable and continuous supply of steel and wood is essential to the current infrastructure and housing development. Central provinces ship out wood to both delta areas.

(5) Cement

The northern ports of Hoan Thach and Hai Phong ship cement nationwide. Huge cement plants here make it possible to meet the demands of all the regions.

6.4.2 Transport demand characteristics

In 1988, throughput amounted to 57 million tons, 38.5% of which was liquid cargo, 40.6% dry cargo and 7.1% transit cargo. The combined share of the 10 major ports was about 42%, with Sai Gon handling the largest volume (14%), followed by Hai Phong (10%) and New Saigon (7%).

Vietnam's overall import volume was larger than export except in 1992, in 1991 in Hai Phong and 1996 in Can Tho.

Past trends showed that cargo handling of cement and fertilizer at Sai Gon and Hai Phong ports is slightly affected by the market served by Ho Chi Minh City. On the other hand, rice is affected by the market served by Hai Phong.

VINAMARINE estimated the total throughput and output of maritime transport by Viet Nam ships in 1998 at 56.6 millions tons (22.6%) and 12.8 millions tons (%), respectively.

Table 6.4.2 Traffic Volumes for 1995 – 1998

Shipping	Unit	1995	1996	1997	1998
Cargo Throughout	Total	34,000	36,656	45,760	56,899
Container	000 TEU	325	465	761	800
Export	000 TEU	153	226	381	376
	000 Tons	1,200	-	3,222	3,079
Import	000 TEU	163	239	372	382
	000 Tons	1,464	-	3,418	4,333
Domestic	000 TEU	-	-	6,898	42
	000 Tons	-	-	33,637	469
Liquid Cargo	000 Tons	13,180	15,511	18,127	21,889
Export	000 Tons	-	-	9,779	11,786
Import	000 Tons	-	-	6,330	7,926
Domestic	000 Tons	-	-	2,018	2,178
Dry Cargo	000 Tons	14,470	17,523	20,927	23,123
Export	000 Tons	-	-	8,181	7,925
Import	000 Tons	-	-	7,538	7,748
Domestic	000 Tons	-	-	5,209	7,450
Transit Cargo	000 Tons	-	2,085	3,551	4,039
Passenger	000 Persons	-	55,981	64,196	47,683

Source) VINAMARINE

Table 6.4.3 Traffic in Major Ports

Port	1994	1995	1996	1997	1998	1998/94
Hai Phong	3,249	4,515	4,809	4,600	5,442	1.7
Sai Gon	6,439	7,212	7,340	6,821	7,700	1.2
Quang Ninh	521	704	813	820	1,011	1.9
Nghe An	306	310	462	480	474	1.6
Da Nang	667	830	847	882	829	1.2
Quy Nhon	403	447	554	838	954	2.4
Nha Trang	214	343	426	424	485	2.3
Can Tho	66	126	183	202	332	5.0
Total	11,864	14,488	15,436	15,067	17,227	1.45
Growth Rate (%/yr)	18%	22%	7%	-2%	14%	10%

Source) GSO "Statistical Yearbook, 1997" and Annual Report by VINAMARINE, 1999

Total 6.4.4 Total Throughput and Output by Vietnam's Ships

		1998	Increase over 1997 (%)
Total Throughput (000 Tons)	Export	24,142	10
	Import	20,772	19
	Domestic	11,644	55
	Total	56,558	232
Carried by Viet Nam Flag Ships (000 Tons)		Tonnage (1998)	4.8
	Overseas	9,440	8
	Domestic	3,405	
	Total	12,845	10

Source) VINAMARINE

Chapter 7 Present Situation of Ports in the Red River Delta

7.1 Outline of ports in the Red River Delta

In the Northern region of Vietnam, there are dozens of ports. These ports are classified into three categories according to management levels as follows:

(1) Ports managed by central level

These ports are managed by MOT (VIWA for river ports, VINAMARINE for sea ports) and operated by state-owned enterprises such as NOWATRANCO and VINALINES.

- River ports: Hanoi, Khuyen Luong, Viet Tri, Hoa Binh, Ninh Binh & Ninh Phuc, A Lu & Dap Cau, etc.
- Sea ports: Hai Phong, Cai Lan & Quang Ninh

(2) Ports managed by local level

Majority of provinces also have their own ports and berths. These ports contribute to the economic development.

- Son Tay, Hong Van, Cong Cau, etc.

(3) Specialized ports

These ports serve specific large-scale economic activities such as thermal power plants, cement plants, paper mills, glass processing plants, etc. These ports are directly managed by various ministries and sectors.

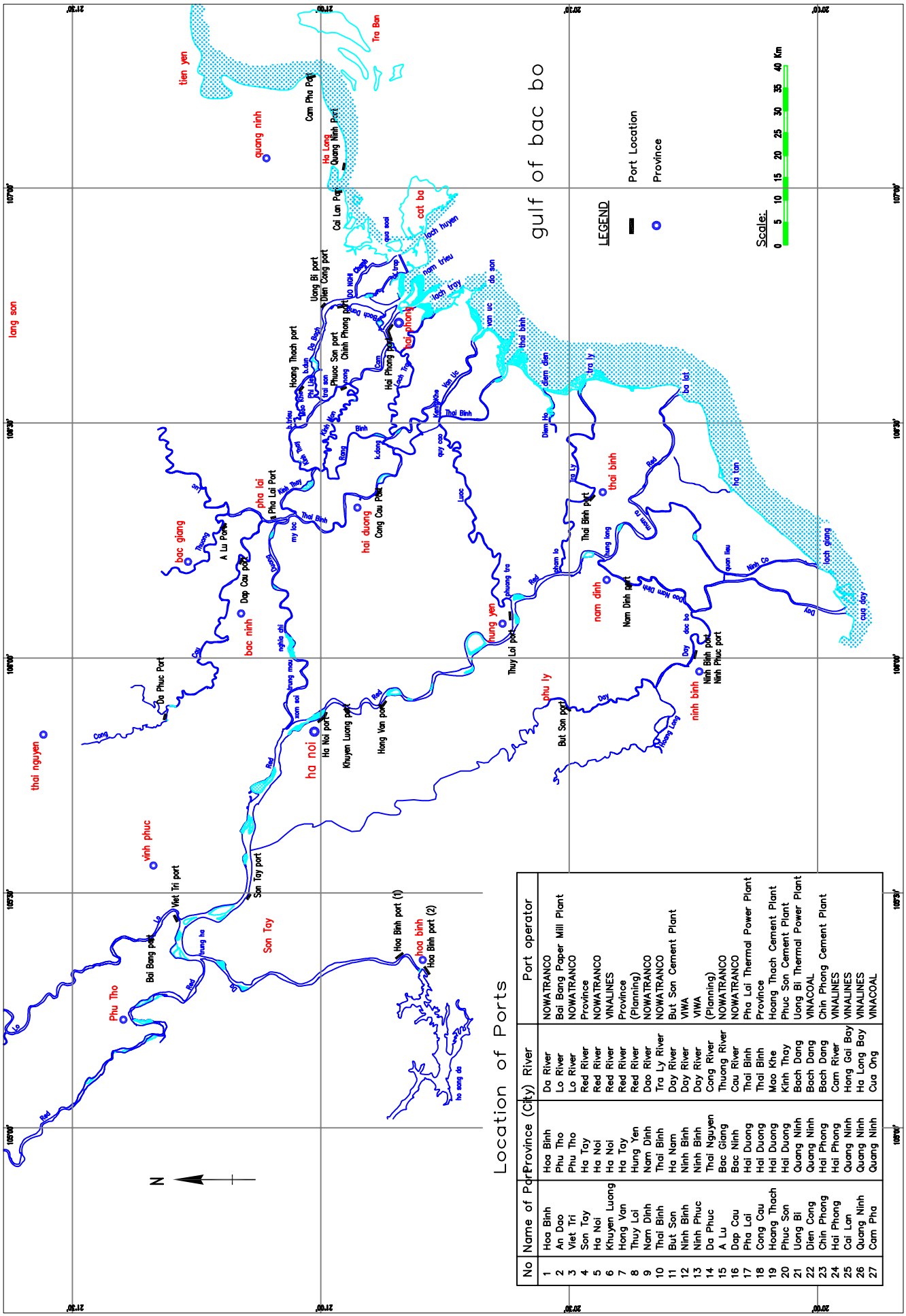
- River ports: Pha Lai (thermal power plant), But Son (cement plant), Hoang Thach (cement plant), Chinh Phong (cement plant), Bai Bang (paper mill), Uong Bi (coal), Dien Cong (coal), etc.
- Sea ports: Cam Pha (coal), etc.

Besides, many berths (landing stages) with poor facilities have been developed after Doi Moi Policy was adopted in 1986. These berths mainly handle construction material.

Table 7.1.1 Location & Operator of Ports in the Northern Region

Port	Province City	River, etc.	Port Operator
Hoa Binh	Hoa Binh	Da River	Hoa Binh Port under NOWATRANCO
An Dao (Bai Bang)	Phu Tho	Lo River	Bai Bang Paper Mill Plant
Viet Tri	Phu Tho	Lo River	Viet Tri Port under NOWATRANCO
Son Tay	Ha Tay	Red River	under province
Hanoi	Hanoi	Red River	Hanoi Port under NOWATRANCO
Khuyen Luong	Hanoi	Red River	Khuyen Luong Port under Vietnam Sea & River Transport Corporation under VINALINES
Hong Van	Ha Tay	Red River	under province
Thuy Loi	Hung Yen	Red River	under province (planning)
Nam Dinh	Nam Dinh	Dao River	Nam Dinh Port under NOWATRANCO
Thai Binh	Thai Binh	Tra Ly River	Thai Binh Port under NOWATRANCO
But Son	Ha Nam	Day River	But Son Cement Plant
Ninh Binh	Ninh Binh	Day River	Transportation and Unload Company of Inland Waterway under VIWA
Ninh Phuc	Ninh Binh	Day River	Transportation and Unload Company of Inland Waterway under VIWA
Da Phuc	Thai Nguyen	Cong River	under province (planning)
A Lu	Bac Giang	Thuong River	Ha Bac Port under NOWATRANCO
Dap Cau	Bac Ninh	Cau River	Ha Bac Port under NOWATRANCO
Pha Lai	Hai Duong	Thai Binh River	Pha Lai Thermal Power Plant under EVN
Cong Cau	Hai Duong	Thai Binh River	under province
Hoang Thach	Hai Duong	Mao Khe River	Hoang Thach Cement Plant
Phuc Son	Hai Duong	Kinh Thay River	Phuc Son Cement Plant (construction)
Uong Bi	Quang Ninh	Bach Dang River	Uong Bi Thermal Power Plant under EVN
Dien Cong	Quang Ninh	Bach Dang River	under VINACOAL
Chinh Phong	Hai Phong	Bach Dang River	Chinh Phong Cement Plant
Hai Phong	Hai Phong	Cam River	Hai Phong Port under VINALINES
Cai Lan	Quang Ninh	Hong Gai Bay	Quang Ninh Port under VINALINES
Quang Ninh	Quang Ninh	Ha Long Bay	Quang Ninh Port under VINALINES
Cam Pha	Quang Ninh	Sea (Cua Ong)	Port & Coal Trading Company under VINACOAL

Source) VIWA



No	Name of Port	Province (City)	River	Port operator
1	Hoa Binh	Hoa Binh	Da River	NOWATRANCO
2	An Dao	Phu Tho	Lo River	Bai Bang Paper Mill Plant
3	Viet Tri	Phu Tho	Lo River	NOWATRANCO
4	Son Tay	Ha Tay	Red River	Province
5	Ha Noi	Ha Noi	Red River	NOWATRANCO
6	Khuyen Luong	Ha Noi	Red River	VINALINES
7	Hong Van	Ha Tay	Red River	Province
8	Thuy Loi	Hung Yen	Red River	(Planning)
9	Nam Dinh	Nam Dinh	Dao River	NOWATRANCO
10	Thai Binh	Thai Binh	Tra Ly River	NOWATRANCO
11	But Son	Ha Nam	Day River	But Son Cement Plant
12	Ninh Binh	Ninh Binh	Day River	VIWA
13	Ninh Phuc	Ninh Binh	Day River	VIWA
14	Da Phuc	Thai Nguyen	Cong River	(Planning)
15	A Lu	Bac Giang	Thuong River	NOWATRANCO
16	Dap Cau	Bac Ninh	Cau River	NOWATRANCO
17	Pha Lai	Hai Duong	Thai Binh	Pha Lai Thermal Power Plant
18	Cong Cau	Hai Duong	Thai Binh	Province
19	Hoang Thach	Hai Duong	Mao Khe	Hoang Thach Cement Plant
20	Phuc Son	Hai Duong	Kinh Thay	Phuc Son Cement Plant
21	Uong Bi	Quang Ninh	Bach Dang	Uong Bi Thermal Power Plant
22	Dien Cong	Quang Ninh	Bach Dang	VINACOAL
23	Chin Phong	Hai Phong	Bach Dang	Chin Phong Cement Plant
24	Hai Phong	Hai Phong	Cam River	VINALINES
25	Cai Lan	Quang Ninh	Hong Gai Bay	VINALINES
26	Quang Ninh	Quang Ninh	Ha Long Bay	VINALINES
27	Cam Pha	Quang Ninh	Cua Ong	VINACOAL

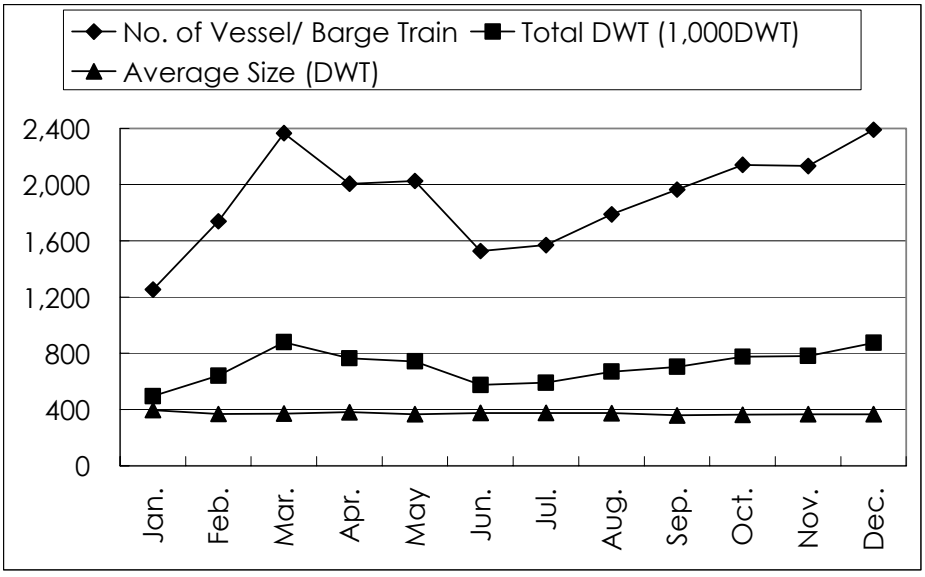
Figure 7.1.1 Location of Ports

Shipcalls at river ports and berths in the Northern region counted by IWPA zone I & II show that port activities are concentrated on the major IWT corridors such as Quang Ninh - Hanoi - Viet Tri and Quang Ninh - Ninh Binh, although the data is said to be lower than actual shipcalls because of difficulty to fully collect tonnage dues. In addition, port activities in flood season are lower than dry season by about 20%, except January because of Tet lunar new year.

Table 7.1.2 Shipcalls to River Ports & Berths counted by IWPA Zone I & II (2001)

Port/Berth	Province/ City	River	No. of Vessel/ Barge Train	Total DWT (1,000DWT)	Average Size (DWT)
An Dao (Bai Bang)	Phu Tho	Lo	200	127	634
Viet Tri	Phu Tho	Lo	500	171	342
Son Tay	Ha Tay	Red	529	127	240
Chem	Hanoi	Red	989	199	201
Hanoi	Hanoi	Red	1,385	305	220
Thanh Tri	Hanoi	Red	521	134	257
Khuyen Luong	Hanoi	Red	192	45	235
Duc Giang	Hanoi	Duong	479	156	326
Nam Dinh	Nam Dinh	Dao	507	106	209
But Son	Ha Nam	Day	1,477	472	320
Ninh Binh	Ninh Binh	Day	363	221	610
Ninh Binh Power Plant	Ninh Binh	Day	352	275	780
Ninh Phuc	Ninh Binh	Day	184	103	557
A Lu	Bac Giang	Thuong	104	24	228
Cong Thon	Bac Giang	Thuong	542	232	428
Bac Giang Fertilizer Plant	Bac Giang	Cau	320	279	872
Got	Bac Giang	Cau	91	20	220
Kinh Noi	Bac Ninh	Cau	160	105	657
Kinh Trang (Dap Cau)	Bac Ninh	Cau	105	31	297
Pha Lai	Hai Duong	Thai Binh	1,138	920	808
Hoang Thach	Hai Duong	Mao Khe	6,228	1,968	316
Dien Cong	Quang Ninh	Da Bach	1,538	820	533
Chinh Phong	Hai Phong	Bach Dang	5,001	1,647	329
Total			22,905	8,487	371

Note) Total DWT counted by IWPA zone I & II in 2001 is 11 million DWT including minor private berths.
Source) VIWA



Source) VIWA

Figure 7.1.2 Shipcalls to River Ports & Berths counted by IWPA zone I & II (2001)

Total cargo throughput of river ports in the Red River Delta which the Study Team identified is 16.2 million tons (unloading: 12.5 million tons, loading: 3.7 million tons, see **Table 7.1.3**). It is noted that these figures do not include those of minor ports/berths outside Hanoi. In addition, cargo throughput of seaports is mentioned in **Chapter 8**.

The reasons why there is imbalance between unloading and loading of river ports can mainly be explained as follows:

- Construction Material	Locations of loading are Lo River upstream of Viet Tri Port for yellow sand and gravel, river bed in the Red River Delta for black sand, Hai Duong Province, Hai Phong City, Ha Nam Province for stone.
- Cement & Clinker	Large part of loading is for the Southern and the Middle regions.
- Coal	Loading of coal is conducted at seaports in Quang Ninh Province.
- Others	Large part of loading is conducted at seaports such as Hai Phong, Cai Lan and Quang Ninh Ports.

Table 7.1.3 Cargo Throughput of River Ports/Berths in the Red River Delta (2001)

Port / Berth	Total	Unloading						Loading					
		Construction Material	Cement & Clinker	Fertilizer	Coal	Others	Total	Construction Material	Cement & Clinker	Fertilizer	Coal	Others	Total
Hoa Binh	31	19			4	2	25					6	6
An Dao (Bai Bang Paper Mill)	51				21	30	51						0
Viet Tri	357	10	40	3	129	60	242			7		108	115
Son Tay	101	38			62		100					1	1
Hanoi	717	439	43		227	8	717						0
Khuyen Luong	195	72	24		52	44	192					3	3
Chem Berths	1,681	1,330	263			88	1,681						0
Thanh Tri Berths	720	567	150			3	720						0
Duc Giang Berths	340	20	240		80		340						0
Bat Trang Bank	420				84	336	420						0
Other berths in Hanoi (Red River, upstream of Duong Bifurcation)	601	420	143		18	20	601						0
Other berths in Hanoi (Red River, downstream of Duong Bifurcation)	781	546	186		23	26	781						0
Other berths in Hanoi (Duong River, downstream of Duong Bifurcation)	541	378	129		16	18	541						0
Hong Van	104	50	1	3	50		104						0
Thuy Loi (Trieu Duong)	29	24			5		29						0
Nam Dinh	130	40	11	21	50		122		8				8
Thai Binh	45	20	15		10		45						0
But Son Cement	681				121	202	323		300			58	358
Ninh Binh & Ninh Phuc	1,012	29			404	73	506		472	28		6	506
Ninh Binh Power Plant	480				480		480						0
Da Phuc (planning)	0						0						0
A Lu	128	50	3	30	40		123					5	5
Dap Cau	280	110	40	36	84	10	280						0
Bac Giang Fertilizer Plant	259				238		238			21			21
Pha Lai Power Plant	1,998				1,982	16	1,998						0
Cong Cau	331	198	52	1	80		331						0
Hoang Thach Cement	2,263				249	395	644		1,619				1,619
Phuc Son Cement (constructing)	0						0						0
Uong Bi Power Plant	223				223		223						0
Dien Cong	375						0				375		375
Chinh Phong Cement	1,346				400	266	666		680				680
Total	16,220	4,360	1,340	94	5,132	1,597	12,523	0	3,079	56	375	187	3,697

Note) There are many berths outside Hanoi which are not included in this table.
Note) Other berths in Hanoi: JICA Study Team estimation.
Source) Port operator of each river port/ berth (interview survey by TDSI and JICA Study Team).

7.2 Ports in the Red River Hanoi segment

7.2.1 Hanoi Port

Hanoi Port is located on the right bank of the Red River and 4 km downstream of the Chuong Duong Bridge. Vicinities of the port are residential area and there is no enough space for future development.

Cargo throughput of Hanoi Port is some 0.6 - 0.7 million tons or half of its designed capacity and main cargoes are construction materials, coal and commodities in bag. Hinterland of the port is Hanoi and a part of Ha Tay and Hoa Binh provinces. Handling equipment such as quay crane is very old and some cranes have been used for more than 30 years. Some port facilities such as quay and fender system are damaged or lacking.

Port operator plans to invest VND 7 billion by 2005 for warehouse (2,000m^2), handling equipment and transport means by its own account (bank loan), not by the state budget. Furthermore, port operator wishes to restrain dirty cargoes such as coal and to convert a part of bulk cargo yard into container yard.

Table 7.2.1 Outline of Hanoi Port

Item	Description
Port Authority	Inland Waterway Port Authority zone II
Port Operator	Hanoi Port under NOWATRANCO
Design Approval	Decision No.293/TTg dated 03/Dec/1974
Designed Capacity	1.2 - 1.3 million tons / year
Total Area	approx. 16 ha
Storage Yard	6 ha
Warehouse	6,380 m^2
Workshop	700 m^2
Handling Equipment	QGC: 2@16t-1984, 3@3t-1979, 1@3t-1940, Mobil (Floating) Crane: 7@1.5m^3-1971, 1@1.5m^3-1982, Folk Lift:1, Truck:10, etc.
Access to the Port	Road: road along the Red River bank
Handling Charge (actual average level after negotiation)	2002: Coal=8,100VND/ton, Cement=9,550VND/ton Construction Material=3,600VND/ton 1998: Bulk=5,000VND/ton, Bag=10,000VND/ton
Tonnage Dues	300VND/DWT (In: 150VND/DWT, Out: 150VND/DWT)

Source) Hanoi Port under NOWATRANCO

Table 7.2.2 Berths of Hanoi Port

Berth No.	Length	Width	Actual Depth (Elevation)	Crown Elevation	Year Built
No.1 - No.3	200m	11m	-5.0m	+11.5m	1980
No.4 - No.6	167m	11m	-8.0m	+11.5m	1984
No.7	50m	20m	-3.0m	+9.0m	1996
No.8	40m	20m	-7.0m	+9.5m	1989
T4	12m	10m	-2.0m	+8.0m	1995
T8	14m	10m	-1.2m	+8.5m	2000
B2	20m	10m	-4.0m	+8.5m	1940
B3	50m	10m	-3.5m	+11.5m	1940
B4	18m	10m	-3.0m	+8.5m	1978

Note) T4 & T8 are temporary piers for dry season.
No.7: for heavy cargo & container and the design vessel size is 2,000 DWT.
Elevation: shown in the National Elevation System (zero m = average water level in long period at the sea area near the Hon Dau island in Hai Phong city)

Source) Hanoi Port under NOWATRANCO

Table 7.2.3 Cargo Throughput of Hanoi Port

(Unit: 1,000 tons)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Throughput	372	484	724	745	723	616	634	766	632	651	717

Note) Almost all cargo handled in Hanoi Port is unloaded.

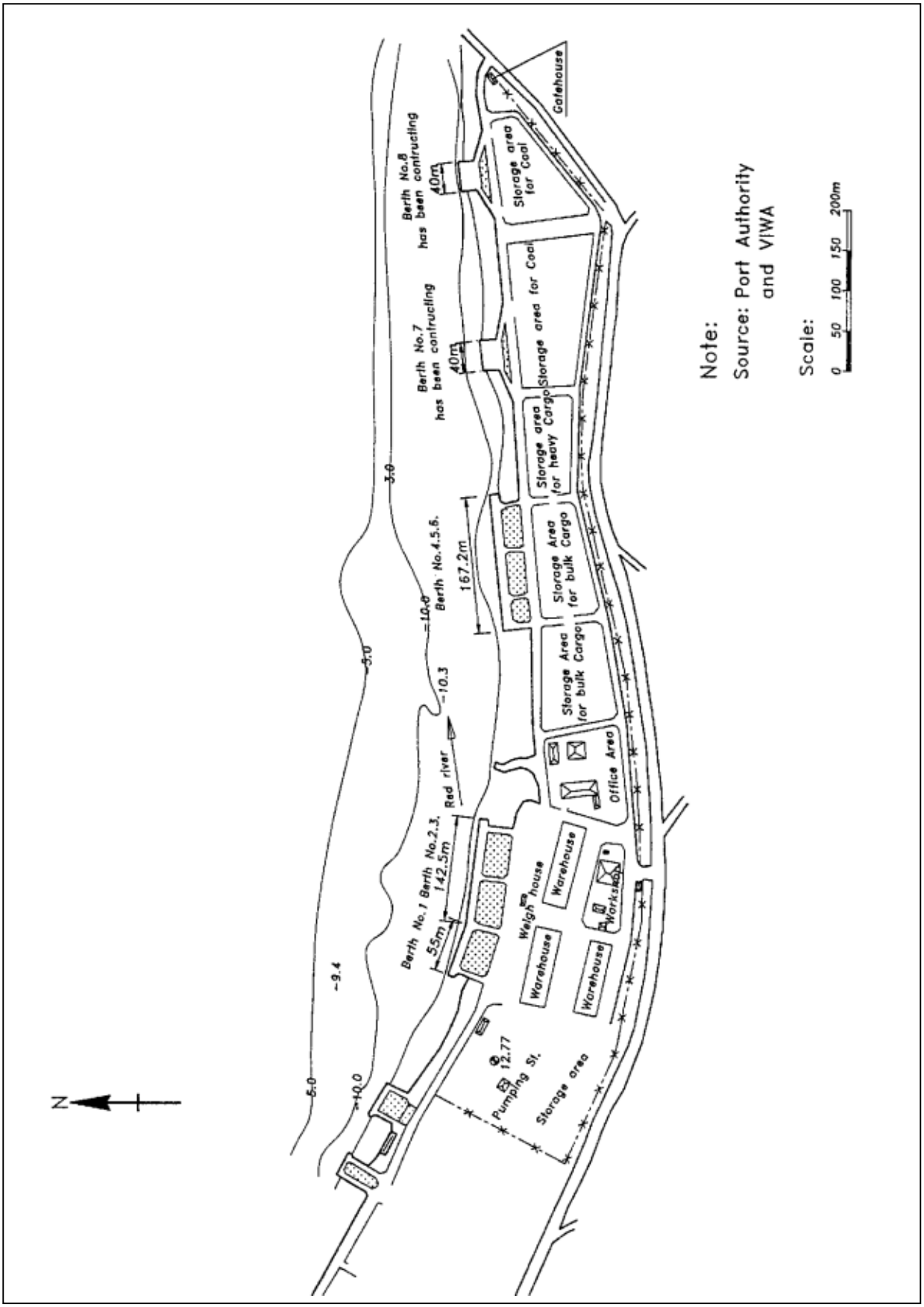
Source) Hanoi Port under NOWATRANCO

Table 7.2.4 Major Commodities & Flow Pattern at Hanoi Port (2001)

(Unit: 1,000 tons)

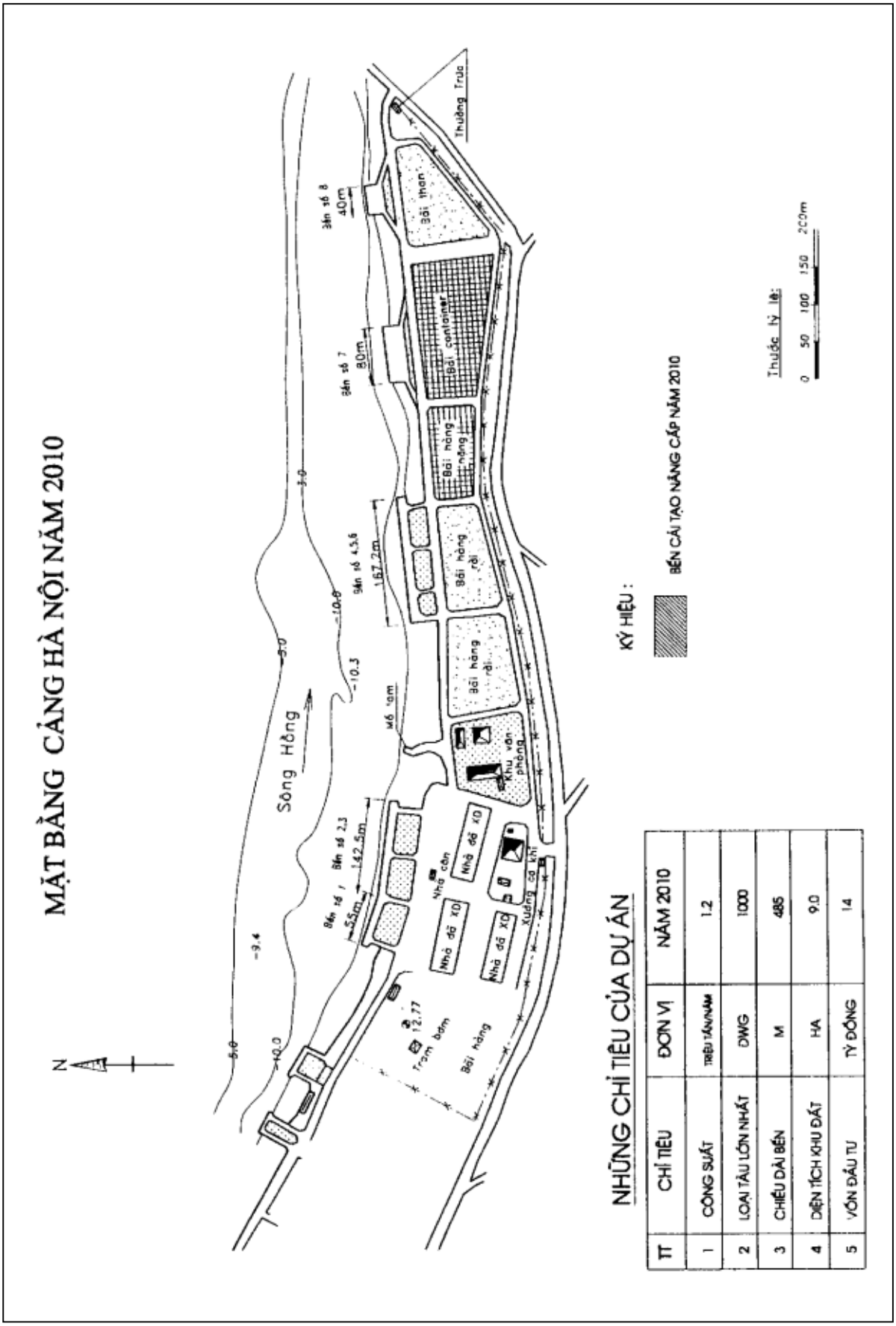
	Major Commodities & Flow Patern
Loading	(small portion: less than 1% of the total)
Unloading	Coal: 227 (from Quang Ninh) Construction Material: 439 Yellow Sand & Gravel: (from Lo River) Black Sand: (from river bed) Cement in bag: 43 (from Hai Phong) Others: 8

Source) Hanoi Port under NOWATRANCO



Source) Red River Waterways Project Vietnam, TA No. 2615 - VIE, Jan. 1998

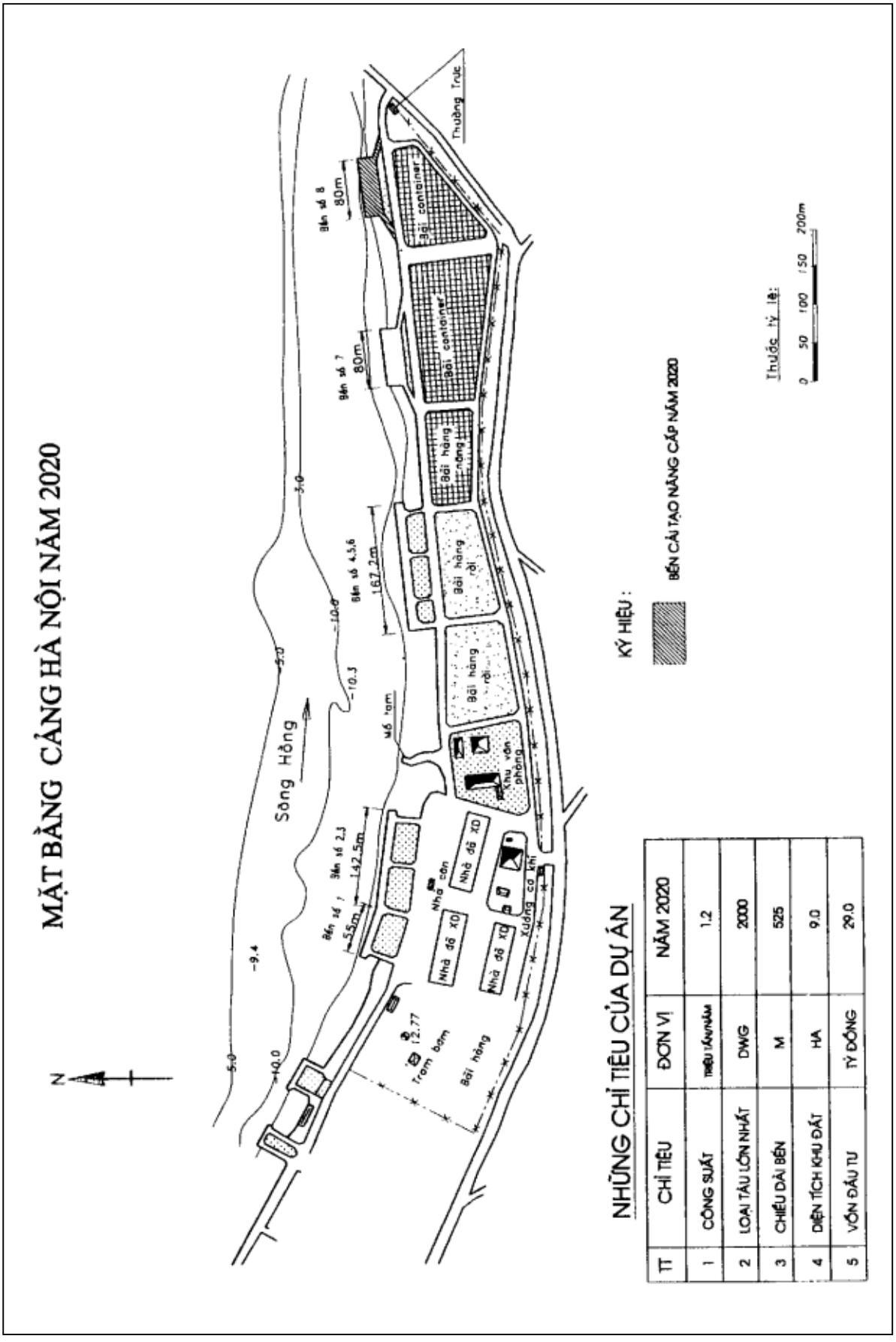
Figure 7.2.1 Layout of Hanoi Port



TT	CHỈ TIÊU	ĐƠN VỊ	NĂM 2010
1	CÔNG SUẤT	TRIỆU TẤN/NĂM	1.2
2	LOẠI TÀU LỚN NHẤT	DWG	1000
3	CHIỀU DÀI BẾN	M	485
4	DIỆN TÍCH KHU ĐẤT	HA	9.0
5	VỐN ĐẦU TƯ	TỶ ĐỒNG	14

Source) M/P on Vietnam Waterway Transport Development up to 2020, Appendix 1, Nov. 2000, VIWA

Figure 7.2.2 Master Plan of Hanoi Port for 2010



Source) M/P on Vietnam Waterway Transport Development up to 2020, Appendix 1, Nov. 2000, VIWA

Figure 7.2.3 Master Plan of Hanoi Port for 2020

7.2.2 Khuyen Luong Port

Khuyen Luong Port was established in 1985 under Sea & River Transport Corporation which was originally under MOT but after 1997 under VINALINES. The port is located on the right bank of the Red River and 9 km downstream of the Hanoi Port. Vicinities of the port are vacant land area, so that there is enough space for future development.

Cargo throughput of Khuyen Luong Port is some 0.2 million tons and main cargoes are commodities in bag and construction materials. Hinterland of the port is the southern part of Hanoi city and a part of Ha Tay and Hoa Binh provinces. Handling equipment such as quay crane is very old in general. Some port facilities such as quay and fender system are damaged or lacking. Khuyen Luong Port was originally designed and constructed for sea-cum river vessels, however, there are not many vessels of this type calling at the port.

Port operator wishes to construct the ICD (inland container depot) when the ring road No.3 and Thanh Tri Bridge are completed.

Table 7.2.5 Outline of Khuyen Luong Port

Item	Description
Port Authority	Inland Waterway Port Authority zone II
Port Operator	Kyuyen Luong Port, Vietnam Sea & River Transport Corporation under VINALINES (under MOT before 1997)
Establishment	Decision No.2030/QD/TCCB dated 11/Oct/1985
Designed Capacity	0.7 million tons / year
Area	Total Area: 11 ha, Storage Yard: 1.0ha Warehouse: 9,617 m^2, Workshop: 120 m^2
Handling Equipment	Rail-mounted Crane: 01@16t, Mobile Crane: 4@10t, Truck: 07@6t-8t, Container Trailer: 2@50t Equipment is at second-hand and old in general.
Access to the Port	Road: 1.4km to road along the Red River bank
Handling Charge (actual average level after negotiation)	2002: Lump Coal=9,500VND/t, Peat Coal=8,000VND/t, Fine Coal=6,500VND/t, Cement=10,000VND/ton 1998: negotiation basis
Port Charge	250VND/DWT (collected by Port Operator)
Tonnage Dues	300VND/DWT (In: 150VND/DWT, Out: 150VND/DWT)

Source) Khuyen Luong Port under VINALINES

Table 7.2.6 Berths of Khuyen Luong Port

Berth No.	Length	Width	Depth	Crown Elevation	Year Built
No.1	22m	(enough)	-2.2m	+7.5m	1979
No.2	84m	(enough)	-2.2m	+10.0m	1985

Note) Elevation: shown in the National Elevation System (zero m = average water level in long period at the sea area near the Hon Dau island in Hai Phong city)

Source) VIWA, Khuyen Luong Port under VINALINES

Table 7.2.7 Cargo Throughput of Khuyen Luong Port

(Unit: 1,000 tons)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Throughput	50	24	38	126	219	225	209	177	184	214	195

Source) Khuyen Luong Port under VINALINES

Table 7.2.8 Major Commodities & Flow Pattern at Khuyen Luong Port (2001)

(Unit: 1,000 tons)

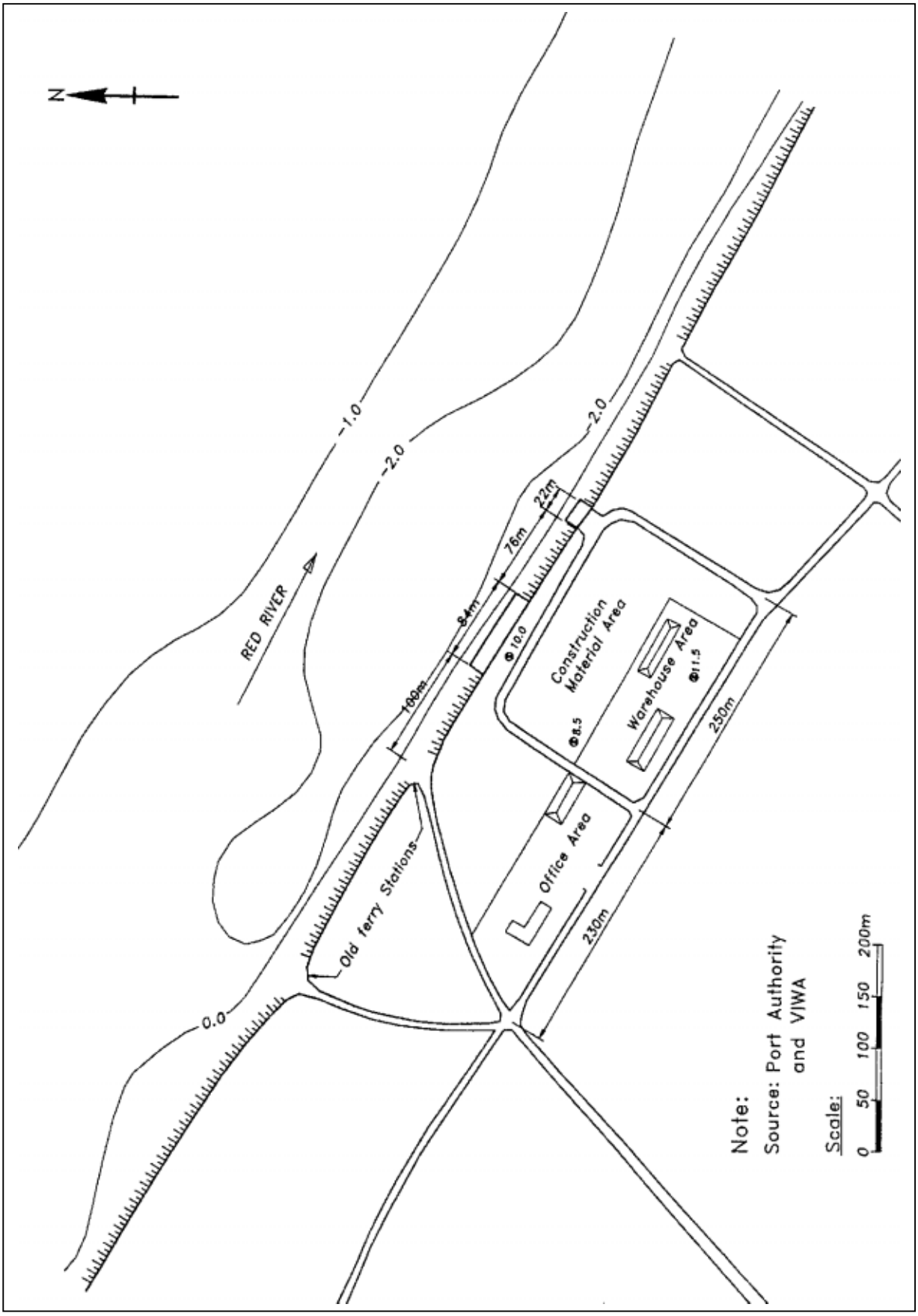
	Major Commodities & Flow Patern
Loading	Animal Food in bag: 3 (to Hai Phong)
Unloading	Coal: 52 (from Quang Ninh) Cement in bag: 24 (from Hai Phong) Construction Material: 72 (from Lo River) Foodgrains and Foodstuffs: 41 (from Hai Phong) Steal and others: 3 (from Hai Phong)

Source) Khuyen Luong Port under VINALINES

Table 7.2.9 Shipcalls & Vessel Size at Khuyen Luong Port

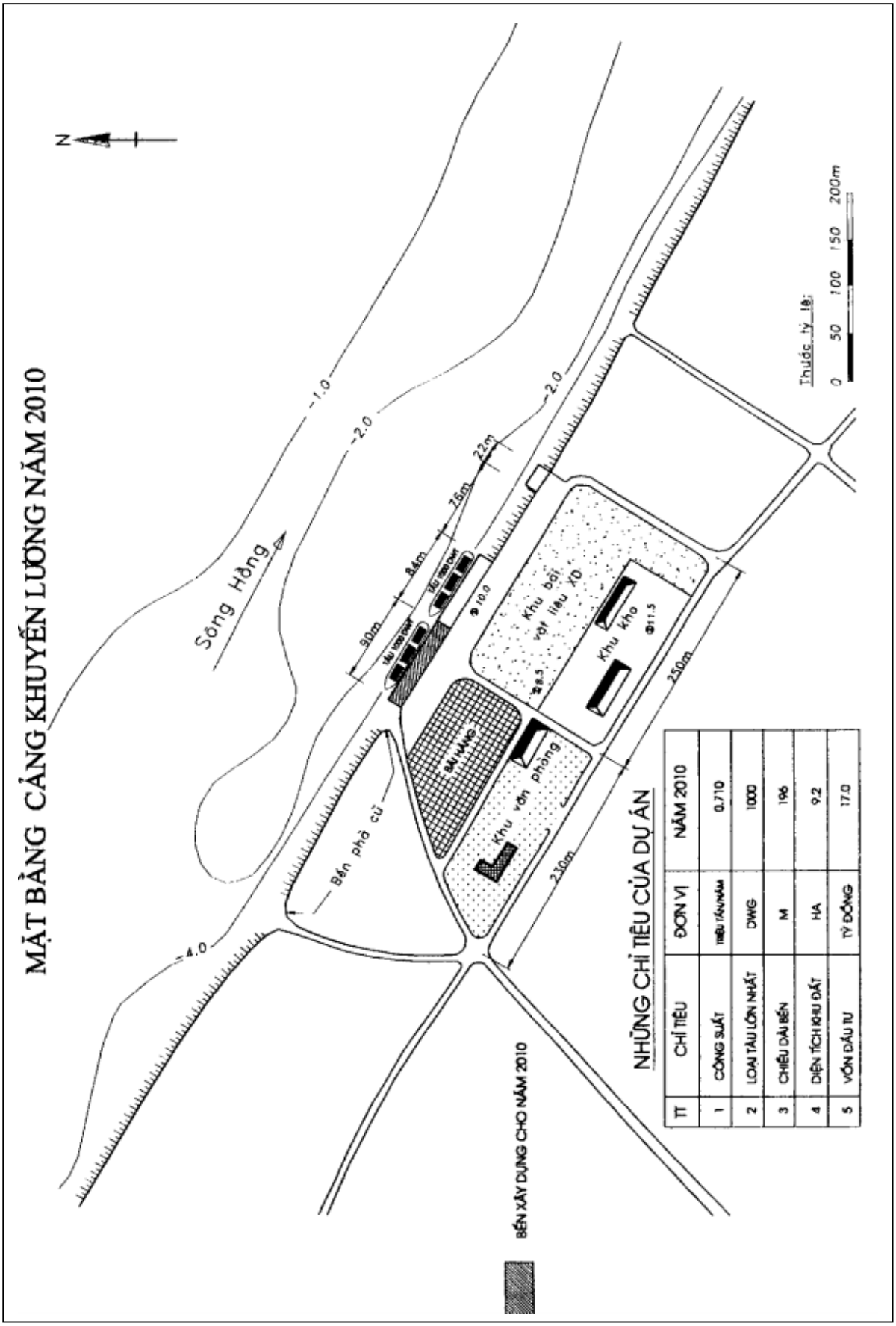
	1995	1996	1997	1998	1999	2000	2001
No. of shipcalls	875	990	696	660	612	712	670

Source) Khuyen Luong Port under VINALINES



Source) Red River Waterways Project Vietnam, TA No. 2615 - VIE, Jan. 1998

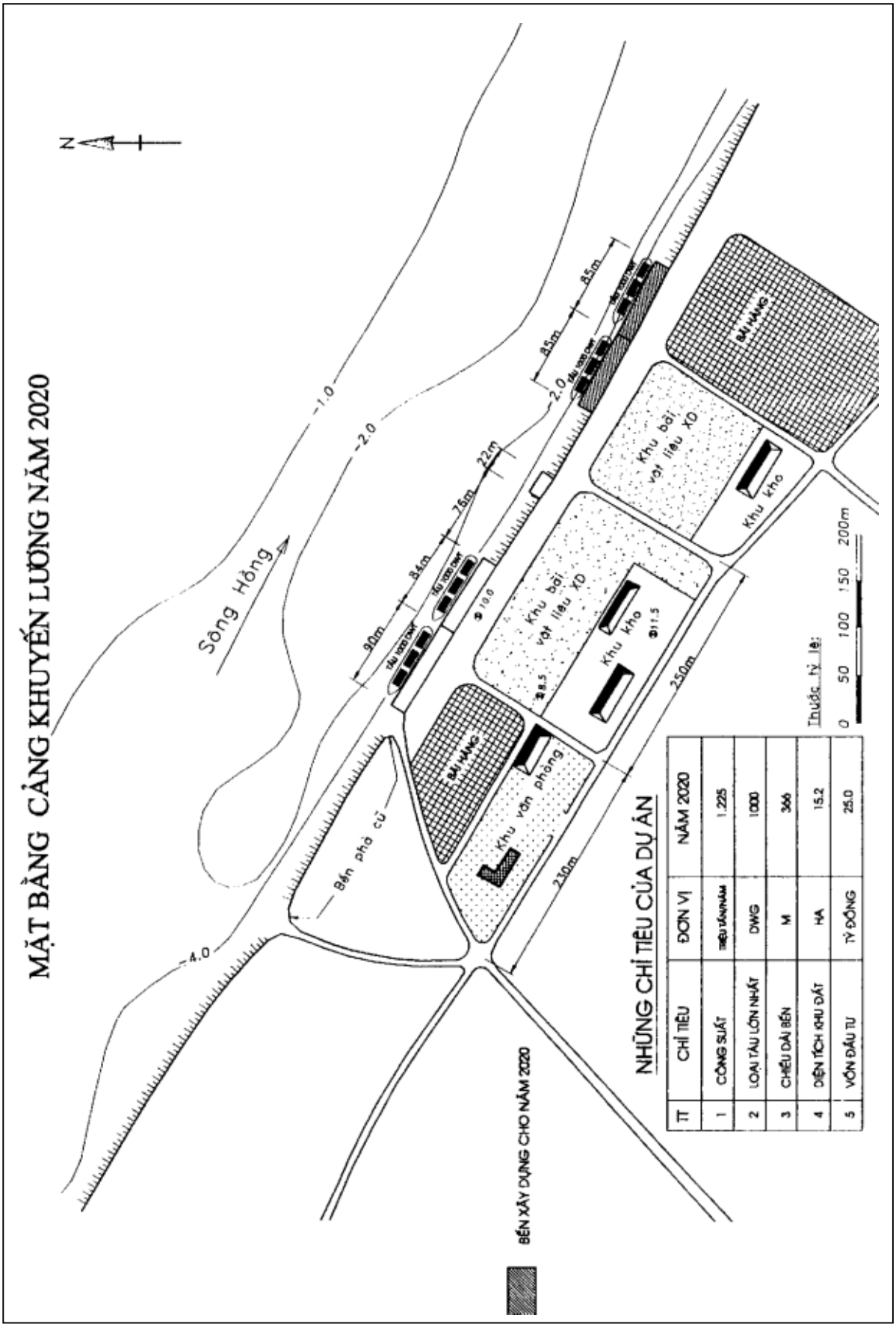
Figure 7.2.4 Layout of Khuyen Luong Port



TT	CHỈ TIÊU	ĐƠN VỊ	NĂM 2010
1	CÔNG SUẤT	TRIỆU TẤN/NĂM	0.710
2	LOẠI TÀU LỚN NHẤT	DWG	1000
3	CHIỀU DÀI BẾN	M	196
4	DIỆN TÍCH KHU ĐẤT	HA	9.2
5	VỐN ĐẦU TƯ	TỶ ĐỒNG	17.0

Source) M/P on Vietnam Waterway Transport Development up to 2020, Appendix 1, Nov. 2000, VIWA

Figure 7.2.5 Master Plan of Khuyen Luong Port for 2010



Source) M/P on Vietnam Waterway Transport Development up to 2020, Appendix 1, Nov. 2000, VIWA

Figure 7.2.6 Master Plan of Khuyen Luong Port for 2020

7.2.3 Other ports and berths

Besides major general ports of Hanoi and Khuyen Luong, there are many small ports and berths (cargo berths, passenger berth, dedicated port and ferries) in the Red River Hanoi segment (see **Table 7.2.10**).

(1) Cargo berths

There can be counted some 70 cranes and 20 sets of steps at berths scattered in Hanoi segment (excluding Hanoi and Khuyen Luong Ports). These berths handle construction material (yellow sand, black sand, gravel, stone), cement in bag, coal and other general cargoes. These berths are operated by enterprises under MOC, MOT and HNPC, private companies as well as individuals.

(2) Passenger berth

Chuong Duong Passenger Berth is located on the right bank and just downstream of the Chuong Duong Bridge. Port facilities consist of a pontoon and a slope way. The passenger berth is operated by Hanoi Waterway Transport Company under Transport & Public Work Dept., HNPC. The company operates 3 passenger boats which can accommodate 40 - 150 passengers and provides services mainly for tourists on weekends. The specifications of passenger boats are as follows:

Ha Noi 3:	150 seats, 135CV, 13km/h, L=32m x B=8m x d=1.25m
Song Hong 5:	40 seats, 90CV, 13km/h, d=0.9m
Thang Long:	40 seats, 180CV, 15km/h, d=1.2m

Typical current itinerary of the passenger boat is as follows:

Tour 1: Departure for down stream 08:00 - 10:10 Dai Lo and Dam Temple (15km downstream of Hanoi) 11:00 - 11:30 Chu Dong Tu - Tien Dung Temple (25km downstream of Hanoi) 12:30 - 14:30 Bat Trang ceramic village 15:30 - 16:30 Arrival

Tour 2: Departure for upstream 08:00 - 10:30 Giong and Mau Temples, Kien So Pagoda 12:00 - 15:00 Bo De Pagoda 16:00 - 16:30 Arrival

Note) Lower Limit for the service: 30 PAX

Ticket price = VND 50,000 (including sightseeing, tourist guide, insurance, VAT, parking)

(3) Dedicated port

Lung Lo Military Port is located on the left bank and just downstream of the Chuong Duong Bridge.

(4) Private ferries

There are small ferryboat services plying only both banks (Thuong Cat, Chem, Phu Thuong, Tu Lien, Bo De, Bat Trang, Khuyen Luong). These ferryboats do not carry cars but passengers, bicycles and bikes. Some of them are suspended.

(5) Cargo throughput of berth groups

There is no accurate and reliable statistics on cargo throughput of berth groups in Hanoi segment. For the better understanding of current situation in Hanoi segment, JICA Study Team tried to estimate the cargo throughput of berth groups as a most likely configuration taking into account plural independent data and information.

Estimated throughput reaches some 5.1 million tons in 2001 and construction material accounts for 64% of the total (see **Table 7.2.11** and **Table 7.2.12**).

Table 7.2.10 Existing Ports/Berths in Hanoi Segment

km+	Bank	No. of Cranes		Operator	Appelation by JICA Study Team
		Total	Quay-side		
Red 4.5	R	1	1	Inland Waterway Engineering & Cargo Handling Enterprise under MOC	
Red 6.0	Lien Mac Sluice				
Red 6.3 - 6.6	R	11	6	Private	Chem Berths
Red 6.6 - 7.2	R	10	5	Construction Material Trading and Exploitation Company under Red River Construction Cooperation under MOC	
Red 7.5	Thang Long Bridge				
Red 7.7 - 8.0	R	7	7	Construction Material Company, under Tu Liem District	
Red 8.5	L	2	2	Private (Mr. Hong, Mrs. Cai)	
Red 14.5	Duong Bifurcation				
Red 19.1	Long Bien Bridge				
Red 19.5	L	3	2	Private (Mr. Duc Hong, Mr. Chu Dinh Dung)	
Red 19.8	Chuong Duong Bridge				
Red 20.0	R	1	1	Private	
Red 20.3	L	0	0	Lung Lo Military Berth	
Red 20.5	L	2	2	Private	
Red 21.0	R	0	0	Passenger Berth (Hanoi Waterway Transport Company under Transport & Public Work Dept. HNPC)	
Red 22.2 - 22.8	R	5	5	Private: 2, Inland Waterway Engineering & Cargo Handling Enterprise under MOC: 1, Hanoi Inland Waterway Transport Company under HNPC: 2, (furtheremore 4 lines of conveyer also exist in addition to cranes)	
Red 23.2 - 25.0	R	see 7.2.1	see 7.2.1	Hanoi Port	Hanoi Port
Red 25.9 - 26.1	R	3	3	Hanoi Transport Company (shiprepair & construction material handling)	Thanh Tri Berths
Red 26.1 - 26.4	R	6	6	Hanoi Engineering and Transport Joint Stock Company	
Red 26.7	Hanoi Shipyard				
Red 27.2	R	2	2	Private	
Red 28.6 - 39.8	L	0	0	17 sets of steps	Bat Trang Bank
Red 30.0	L	0	0	01 set of steps for passenger boat	
Red 30.0	Xuan Quang Sluice				
Red 31.0	L	0	0	04 sets of steps (Kim Lan Commune)	
Red 32.8	R	0	0	Ferry Berth	
Red 33.0	L	0	0	Ferry Berth	
Red 33.0 - 33.5	R	see 7.2.2	see 7.2.2	Khuyen Luong Port	Khuyen Luong Port
Duong 4.5	R	2	2	Private (construction material)	Duc Giang Berths
Duong 5.0	R	3	3	Hanoi Construction & Handling Company under HNPC, Oil & Petrol Company Area No.1, Waterway Transport Company No.1 under NOWATRANCO	
Duong 8.0		Duong Bridge			
Duong 8.2	R	1	1	Fixed overhead crane (Duong Bridge Timber Company, paper)	
Duong 8.3 - 9.0	L	8	8	Private (construction material)	

Note) km+ of Red River is set by JICA Study Team (cf: Thang Long Bridge = +7.5, Chuong Duong Bridge = +19.8, Xuan Quang Sluice = +30.0).

Note) km+ of Duong River is based on ADB study in 1998 (cf: Duong Bridge = +8.0).

Source) Field survey by JICA Study Team in July 2002

Table 7.2.11 Throughput Estimation of Berth Groups (2001)

Berth Group	Location (River km+) (Bank)	Shipcalls counted by IWPA (1000DWT)	No. of Crane observed by JICA Study Team (unit)	Throughput in 2001 (1000 ton)						
				Calculation based on Average Crane Capacity			Calculation based on Shipcalls (L/F=0.5)	Interview Survey by TEDI-Port	Interview Survey by TDSI	Set Throughput by JICA Study Team
				60,000 ton/unit	80,000 ton/unit	100,000 ton/unit				
Chem Berths	Red +6.5 - 7.0 Right	199	21	1,260	1,680	2,100	398	166	960	1,680
Thanh Tri Berths	Red +25.5 - 25.8 Right	134	9	540	720	900	268	124	517	720
Duc Giang Berths	Duong +4.5 - 5.0 Right	156	5	300	400	500	312	(-)	340	340
Bat Trang Bank	Red +29.0 - 30.0 Left	(-)	0	0	0	0	(-)	(-)	420	420
Other Berths (upstream of Duong Bifurcation)	Red	(-)	10	600	800	1,000	(-)	(-)	(-)	600
Other Berths (downstream of Duong Bifurcation)	Red	(-)	13	780	1,040	1,300	(-)	(-)	(-)	780
Other Berths (downstream of Duong Bridge)	Duong	(-)	9	540	720	900	(-)	(-)	(-)	540
Total		(-)	67	4,020	5,360	6,700	(-)	(-)	(-)	5,080

Note) km+ of Red River is set by JICA Study Team (cf: Thang Long Bridge = +7.5, Chuong Duong Bridge = +19.8, Xuan Quang Sluice = +30.0).
Note) km+ of Duong River is based on ADB study in 1998 (cf: Duong Bridge = +8.0).
Note) No. of crane of others: see Table 7.2.10
Note) Reliability of the interview survey by TDSI is considered to be high enough but it does not include a part of private berths.
Note) Throughput of other berths is set taking into accout the crane capacity (other Berths downstream of Duong Bridge have few yard space).

Table 7.2.12 Estimated Throughput of Berth Groups by Cargo Type (2001)

Berth Group	Location (River km+) (Bank)	Throughput in 2001 (1000 ton)					Note
		Construction Material	Cement	Coal	Others	Total	
Chem Berths	Red +6.5 - 7.0 Right	1,330	263	0	88	1,680	Estimation by JICA Study Team
Thanh Tri Berths	Red +25.5 - 25.8 Right	567	150	0	3	720	Estimation by JICA Study Team
Duc Giang Berths	Duong +4.5 - 5.0 Right	20	240	80	0	340	Interview Survey by TDSI
Bat Trang Bank	Red +29.0 - 30.0 Left	0	0	84	336	420	Interview Survey by TDSI
Other Berths (upstream of Duong Bifurcation)	Red	420	143	18	20	600	Estimation by JICA Study Team
Other Berths (downstream of Duong Bifurcation)	Red	546	186	23	26	780	Estimation by JICA Study Team
Other Berths (downstream of Duong Bridge)	Duong	378	129	16	18	540	Estimation by JICA Study Team
Total		3,260	1,110	220	490	5,080	

Note) km+ of Red River is set by JICA Study Team (cf: Thang Long Bridge = +7.5, Chuong Duong Bridge = +19.8, Xuan Quang Sluice = +30.0).
Note) km+ of Duong River is based on ADB study in 1998 (cf: Duong Bridge = +8.0).
Note) Cargo type balance of other berths are assumed to be the same as that of Chem, Thang Tri and Duc Giang Berths.