JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DEVELOPMENT STRATEGY INSTITUTE (DSI)
MINISTRY OF PLANNING AND INVESTMENT (MPI)
THE SOCIALIST REPUBLIC OF VIET NAM

THE STUDY
ON
THE INTEGRATED REGIONAL SOCIO-ECONOMIC
DEVELOPMENT MASTER PLAN
FOR
THE KEY AREA OF THE CENTRAL REGION
OF
THE SOCIALIST REPUBLIC OF VIET NAM

FINAL REPORT
SECTOR REPORT VOL.2

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PACIFIC CONSULTANTS INTERNATIONAL
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CHAPTER 12 URBAN DEVELOPMENT

12.1 SOCIO-ECONOMIC CONDITIONS OF URBAN AREAS

12.1.1 Urbanization Situation

The study area is the third largest urban center in the country. It is expected to serve as growth pole in the central region under the national development policy in order to realize balanced regional growth. The study area has about one million urban population, out of 4.5 million population. Da Nang City serving as a regional center with 0.4 million of urban population, is the third largest urban concentration in the country, following HCMC, with 3.2 million urban population and Ha Noi with 1.1 million. However, the study area's overall urbanization, is not as high as North and South Triangle, but just above the national average.

Population in the study area is concentrated on a plain land along QL 1, as shown in Figure 12.1. The biggest urban center in the study area is Da Nang City, followed by Hue City and Quang Ngai Town. Of all cities and towns in the study area, Da Nang City and Quang Tri Town are 100% urbanized, followed by Dong Ha Town, 82.8% and Hue City, 80.6% . Hoi An Town, Tam Ky Town, and Quang Ngai Town are still at low urbanized status.

Growth rate of urban population of the study area is 1.7% from 1993 to 1994 far below the national average of 3.6%. Those for the respective provinces are 2.8% in Quang Tri, 2.6% in Thua Thien-Hue, 1.1% in Quang Nam-Da Nang, and 2.1% in Quang Ngai.

Regarding population density, the cities, the towns and the districts around the provincial capitals show higher density (Figure 12.2).

Table 12.1 Population of Growth Poles

Area	Population ('000)	Percent to National Total	Urban Population ('000)	Percent to National Total	Urbanization (%)
North Triangle	4,709	6.6	2,078	14.7	44.2
South Triangle	6,876	9.6	3,932	27.8	57.2
Study Area	4,662	6.5	1,051	7.4	22.5
Vietnam	71,465	100.0	14,139	100.0	19.8

Note: North Triangle: Ha Noi, Hai Phong, and Quang Ninh; South Triangle: Ho Chi Minh, Dong Nai, and Ba Ria Vung Tau
Source: Statistical Yearbook 1994

12.1.2 Economic Performance in Urban Area

Da Nang City is the predominant economic center with 1,498 billion VND, or 22.5% of the study area's total GRDP, 6,660 billion VND in 1994 at current price. Following Da Nang are Hue City (709 bil. VND, 10.6%), Quang Ngai Town (360 bil. VND, 5.4%), Tam Ky Town (234 bil. VND, 3.5%), Hoa Vang (218 bil. VND, 3.3%), Dien Ban (210 bil. VND, 3.1%), and Thang Binh (187 bil. VND, 2.8%).

Figure 12.1 Distribution of Total and Urban Population (1994)

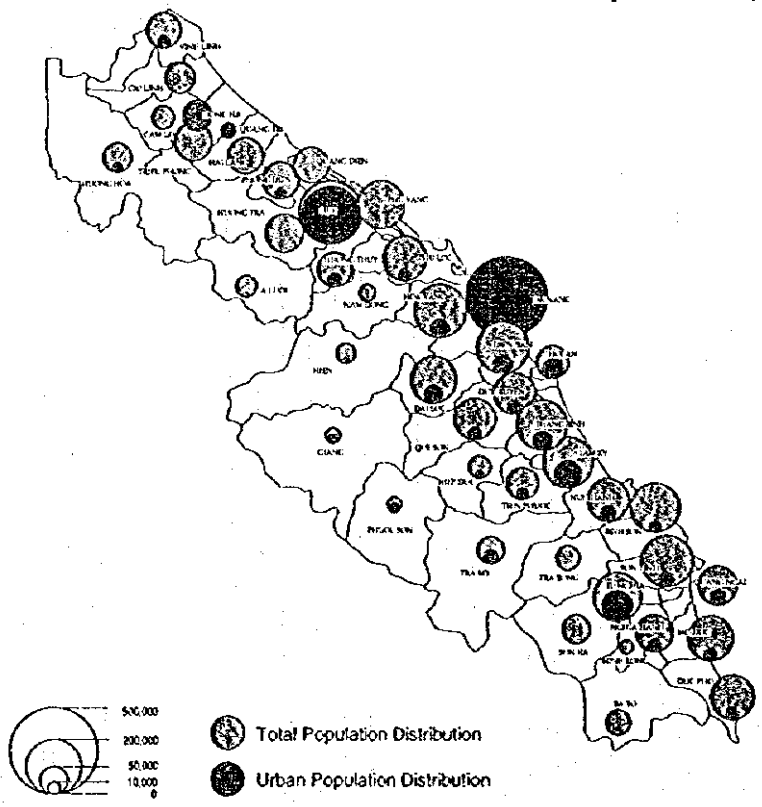


Figure 12.2 Population Density (1994)

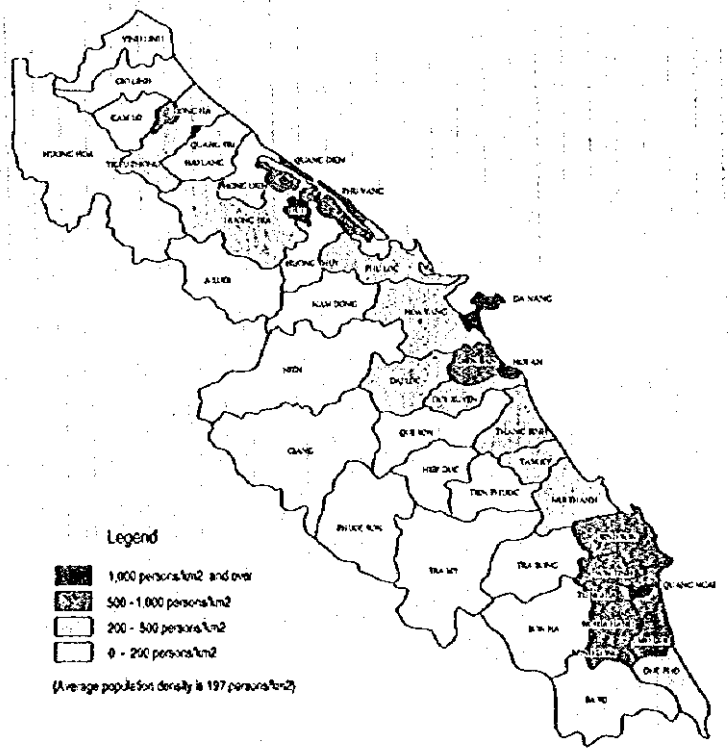


Table 12.2 Population by District

Area	Land (ha in1994)		Population (1994)			Urban pop/	Urban pop. Share in		Pop. density (per'sq km)	
	Total	Inhabitant	Total	Urban	Rural	Total pop.	Province	Study Area	Total Area	Inhabitant
Study Area	2,355,851	39,827	4,636,394	1,133,612	3,502,782	24.5%		100.0%	197	11,641
Quang Tri	255,210	9,582	514,230	82,535	431,695	16.1%	100.0%	7.3%	201	5,367
Dong Ha town	7,626	535	61,272	50,750	10,522	82.8%	61.5%	4.5%	803	11,446
Quang Tri town	528	81	13,973	13,973	-	100.0%	16.9%	1.2%	2,646	17,229
Vinh Linh	62,623	2,203	84,246	10,956	73,290	13.0%	13.3%	1.0%	135	3,825
Gio Linh	48,167	1,468	64,468	-	64,468	-	-	-	134	4,390
Cam Lo	35,199	1,121	37,953	-	37,953	-	-	-	108	3,385
Trieu Phong	51,205	2,124	102,925	-	102,925	-	-	-	201	4,846
Hai Lang	49,872	2,049	89,960	-	89,960	-	-	-	180	4,390
Huong Hoa	-	-	59,433	6,856	52,577	11.5%	8.3%	0.6%	-	-
TT-Hue	384,977	8,675	992,329	252,176	740,153	25.4%	100.0%	22.2%	258	11,439
Hue city	6,777	1,684	276,366	222,815	53,551	80.6%	88.4%	19.7%	4,078	16,408
Phong Dien	107,130	1,049	93,980	-	93,980	-	-	-	88	8,963
Quang Dien	15,697	963	84,671	-	84,671	-	-	-	539	8,796
Huong Tra	40,274	1,259	102,852	7,440	95,412	7.2%	3.0%	0.7%	255	8,167
Phu Vang	26,316	1,411	157,078	-	157,078	-	-	-	597	11,134
Huong Thuy	49,662	807	83,708	11,224	72,484	13.4%	4.5%	1.0%	169	10,378
Phu Loc	69,243	1,254	140,244	10,697	129,547	7.6%	4.2%	0.9%	203	11,186
Nam Dong	69,877	249	21,546	-	21,546	-	-	-	31	8,653
A Luoi	-	-	31,884	-	31,884	-	-	-	-	-
QN-Da Nang	1,198,820	12,034	1,951,985	672,501	1,279,484	34.5%	100.0%	59.3%	163	16,221
Da Nang city	9,520	618	437,291	437,291	-	100.0%	65.0%	38.6%	4,593	70,816
Hoi An town	6,020	311	74,252	28,196	46,056	38.0%	4.2%	2.5%	1,233	23,914
Tam Ky town	38,120	947	158,040	50,829	107,211	32.2%	7.6%	4.5%	415	16,696
Hoa Vang	87,940	2,515	195,837	21,697	174,140	11.1%	3.2%	1.9%	223	7,788
Hien	176,160	171	27,166	2,068	25,098	7.6%	0.3%	0.2%	15	15,887
Dai Loc	56,200	751	150,944	19,623	131,321	13.0%	2.9%	1.7%	269	20,096
Dien Ban	21,070	916	181,068	19,918	161,150	11.0%	3.0%	1.8%	859	19,767
Duy Xuyen	28,960	794	119,732	12,312	107,420	10.3%	1.8%	1.1%	413	15,081
Giang	183,360	41	16,957	5,696	11,261	33.6%	0.8%	0.5%	9	41,869
Que Son	73,480	565	119,723	10,129	109,594	8.5%	1.5%	0.9%	163	12,412
Thang Binh	38,890	1,973	171,763	20,833	150,930	12.1%	3.1%	1.8%	442	8,705
Hiep Duc	48,650	391	35,675	3,061	32,614	8.6%	0.5%	0.3%	73	9,122
Phuoc Son	126,060	56	16,292	6,184	10,108	38.0%	0.9%	0.5%	13	29,302
Tien Phuoc	52,550	512	68,646	7,026	61,620	10.2%	1.0%	0.6%	131	13,413
Nui Thanh	52,680	806	127,543	15,363	112,180	12.0%	2.3%	1.4%	242	15,834
Tra My	168,660	270	51,056	12,275	38,781	24.0%	1.8%	1.1%	30	18,896
Hoang Sa	30,500	-	-	-	-	-	-	-	-	-
Quang Ngai	516,834	9,537	1,177,850	126,400	1,051,450	10.7%	100.0%	11.2%	228	12,351
Quang Ngai town	3,640	376	104,850	62,000	42,850	59.1%	49.1%	5.5%	2,880	27,923
Ly Son	1,070	61	16,910	-	16,910	-	-	-	1,580	27,721
Binh Son	46,330	1,043	169,030	8,100	160,930	4.8%	6.4%	0.7%	365	16,203
Tra Bong	69,690	336	40,200	-	40,200	-	-	-	58	11,975
Son Tinh	32,100	1,379	183,950	11,400	172,550	6.2%	9.0%	1.0%	573	13,339
Son Ha	73,870	237	59,260	-	59,260	-	-	-	80	25,057
Son Tay	41,970	218	11,250	-	11,250	-	-	-	27	5,161
Tu Nghia	23,020	2,106	165,510	13,700	151,810	8.3%	10.8%	1.2%	719	7,859
Minh Long	26,044	135	13,560	-	13,560	-	-	-	52	10,030
Nghia Hanh	22,740	711	91,910	8,950	82,960	9.7%	7.1%	0.8%	404	12,925
Mo Duc	26,350	1,254	138,950	9,400	129,550	6.8%	7.4%	0.8%	527	11,085
Duc Pho	38,380	1,729	139,400	8,300	131,100	6.0%	6.6%	0.7%	363	8,065
Ba To	111,630	172	43,070	4,550	38,520	10.6%	3.6%	0.4%	39	25,099

Source: GSO and 1994 Statistical Yearbook

These areas altogether produce more than half of the total GRDP of the study area. These districts other than Hue City and Quang Ngai Town are districts neighboring on the south of Da Nang City; Da Nang area forms big economic zones. Areas around Da Nang and the other provincial capitals serves as the high economic performing areas.

Services sector is the leading economic sector in the study area, accounting for 2,777 billion VND, or 41.7% of the study area's total. Da Nang, accounting for 34 % of the total services sales, is the largest service center of the study area. The second is HueCity with 13.3% of share. The areas where services is the largest producer are Dong Ha (61% of the services total), Quang Tri Town (87.5%), Hue City (51%), Da Nang City (63%), and Hoi An (47%). They are provincial capitals or old capital or tourist destination which inherently have service and/or public administration functions.

Following services sector, industry is the second largest, earning 1,120 billion VND, 16.8%of the total GRDP. Da Nang City is the biggest industrial center in the study area, accounting for 410 billion VND, or some 37% of the total industrial gross product. Hue City, producing 282 billion VND, 25% of the total, is the second; Quang Ngai Town (167 billion VND, 15%) the third. The three areas altogether produce more than three-quarters of the study area's total industrial products.

Agriculture is the leading contributor to economies of the most districts, although it does not show a big gross products. On the other hand, services sector is predominant in Dong Ha Town, Quang Tri Town, Hue City, Da Nang City, and Hoi An Town. Industry is the leading economy only in Quang Ngai Town with its large production of state-run sugar-making plants. It is obvious that there are clear distinction between urban and rural economies. The rural areas are dependent strongly on agriculture sector with small value in product while urban areas are non-agriculture economy with high valued products.

Figure 12.3 Ranking in Economic Performance

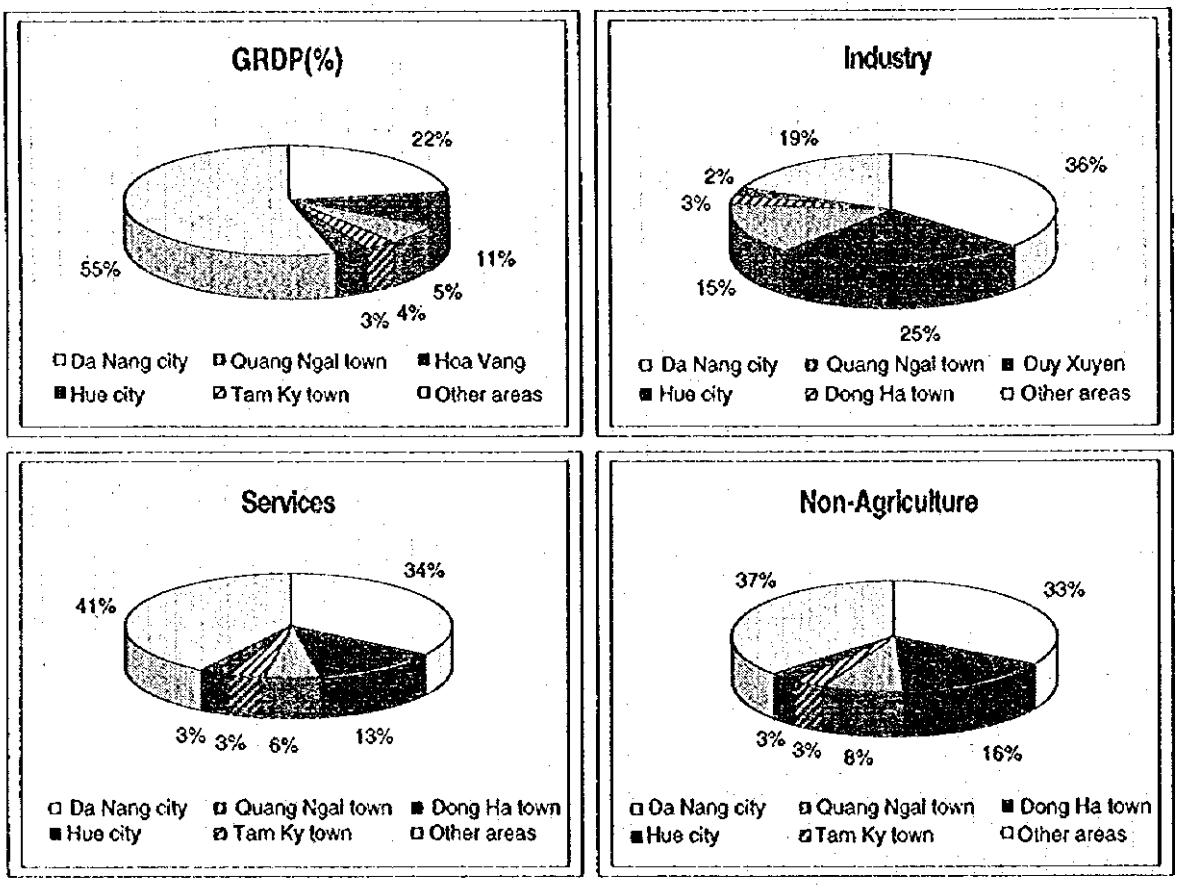
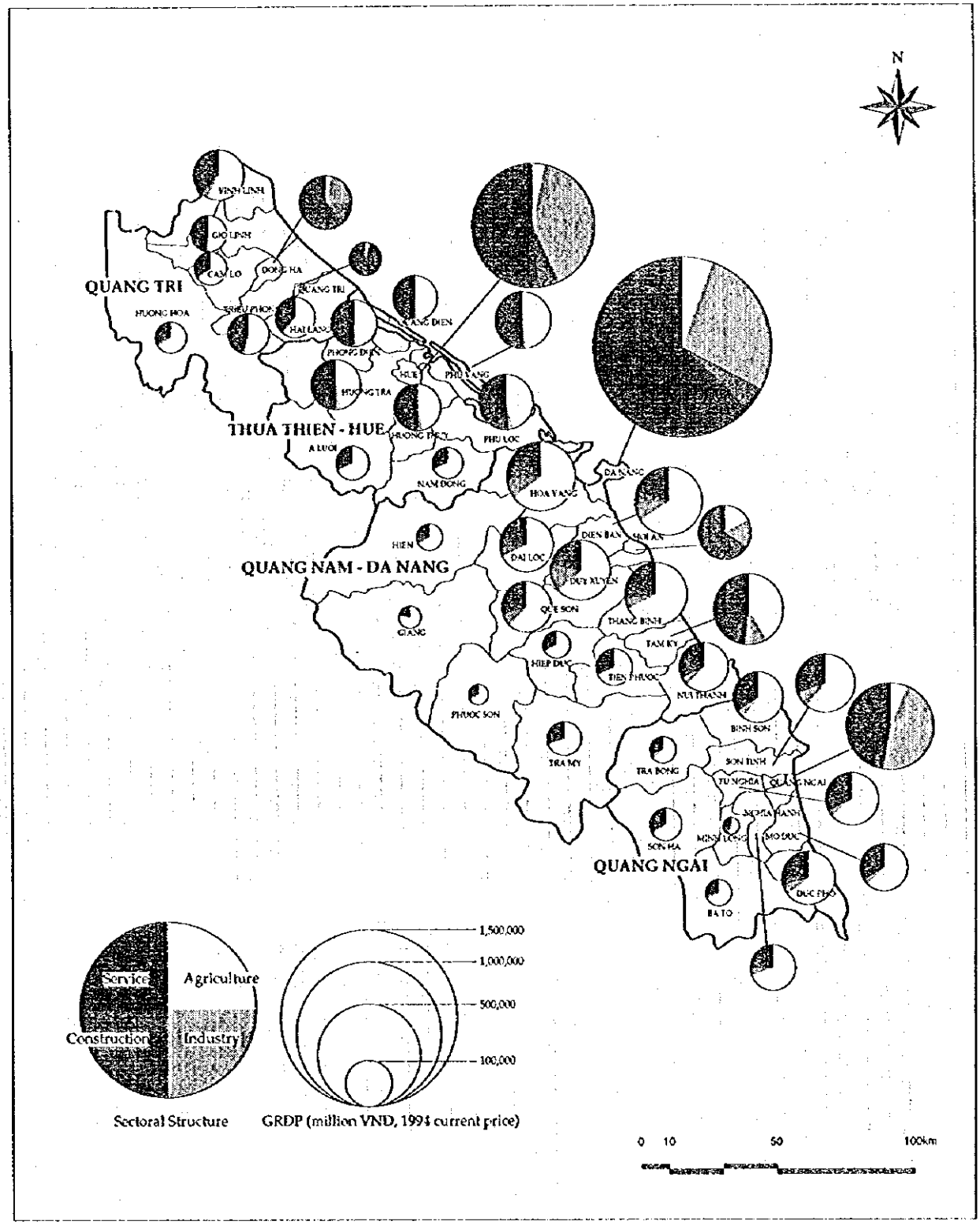


Figure 12.4 GRDP by District



12.1.3 Urban Infrastructure

The following summarizes present conditions of infrastructure in cities and towns in the study area. Further details of these infrastructure are described in the corresponding chapters.

1) Dong Ha and Quang Tri

Area		Present Condition of Infrastructure
Dong Ha	**Transport**	
	• Road network:	- National Highway No.1 (South-North)
		- National Highway No.9 (to West towards Lao through Lao Bao)
	• Railway:	- National Railway
	• Seaport:	- Cua Viet port (being improved)
	• Airport:	- None
	Utility:	
	• Water supply:	- 15,000 c.m./day capacity to cover 45% of population
	• Sewerage:	- 2.0 km sewerage pipes along QL 1 and QL 9, covering 11,000 people.
	• Power Supply:	- Coverage: Total, 96.5%; Inside town, 100%; outside town, 79.8%
	• Solid Waste:	- 50% of the garbage collected. (5 c.m./day out of 10 c.m./day generated)
	• Telephone:	- Province: 1,883 units in 1994 (0.37 phones/100 persons)
Quang Tri	**Transport**	
	- Road network:	- National Highway No.1 (South-North). Town center is 1 km off from it.
	- Railway:	- National Railway
	- Seaport:	- None
	- Airport:	- None
	Utility:	
	• Water supply:	- 1,000 c.m./day
	• Sewerage:	- None
	• Power Supply:	- 100% coverage
	• Solid Waste:	- N.A.

2) Hue

Area		Present Condition of Infrastructure
Hue	**Transport**	
	• Road network:	- National Highway No.1 (south-north)
		- National Highway No.49 (to west to A Luoi)
		- Two bridges crossing over the Huong River, one for cars and other for pedestrians, bikes, and cyclos. Railway bridge with a pedestrians pass on it.
	• Railway:	- National Railway, Hue station on the west side of the left bank of the Huong River.
	• Seaport:	- Phu Bai airport for domestic flight is 20 km east from downtown
	• Airport:	- Thuan An port
	Utility:	
	• Water supply:	- 28,000c.m./day to cover 50% of population
	• Sewerage:	- 42.2 km sewerage pipe
	• Power Supply:	- 100% electricity rate (out of 41,262 Households in 1994)
	• Solid Waste:	- 60 c.m./day collected out of 100 c.m./day generated.
	• Telephone:	- Province level: 4,356 units/province (0.44 phones/100 persons)

3) Da Nang, Hoi An, and Tam Ky

Area		Present Condition of Infrastructure
Da Nang	**Transport**	
	• Road network:	- National Highway No.1 and No.14B, and Provincial Road 604.
	• Railway:	- National Railway
	• Port:	- Tien Sa port
	• Airport:	- Da Nang International Airport in the west side of the city
	Utility:	
	• Water supply:	- 54,000 c.m./day to cover 100% of population
	• Sewerage:	- 117 km of sewage pipe
	• Solid Waste:	- 300 c.m./day collected out of 400 c.m. generated
	• Power Supply:	- 100% coverage
	• Telephone:	- Province: 10951 units (0.56 unit/100 persons)
Hoi An	**Transport**	
	• Road network:	- Provincial Highways: 607 to Da Nang, 608 to Vinh Dien on National Highway No.1
	• Railway:	- None
	• Seaport:	- None
	• Airport:	- None (Da Nang International Airport, 20 km north)
	Utility:	
	• Water supply:	- 6,000 c.m./day
	• Sewerage:	- None
	• Solid Waste:	- N.A.
	• Power supply	- 91.5%
Tam Ky	**Transport**	
	• Road network:	- National Highway No. 1 (South -North), Provincial Highway 616 to west (Tra My)
	• Railway:	- National Railway
	• Seaport:	- None
	• Airport:	- Chu Lai Airport (unused military airport) is 35 km south
	Utility:	
	• Water supply:	- 2,000 c.m./day
	• Sewerage:	- 2.3 km sewerage pipes along QL 1.
	• Solid Waste:	- N.A.
	• Power Supply:	- 63.5% coverage

4) Quang Ngai

Area		Present Condition of Infrastructure
Quang Ngai	**Transport**	
	• Road network:	- National Highway No.1 (South-North direction on the middle of the Town), No. 24 (to towards Kon Tum) - Bridges over the Han River
	• Sea Port:	- Sa Ky port (100,000 mill. ton /year)
	• Railway:	- National Railway, Quang Ngai station located on the west side of the Town
	• Airport:	- Only 400m approach which is used for military helicopters
	Utility:	
	• Water supply:	- 8,000 c.m./day capacity
	• Sewerage:	- Total length of 7,793m
	• Solid Waster:	- 45 c.m./day collected (capacity of 2,000 t/year)
	• Power Supply:	- Provincial consumption: 46.8 Mkwh. 40.7 kwh/year/capita (expected to be 100-150 kwh in 2000) - Electricity rate: 95.6% town total (100% inside town; 88% outside town)
	• Telephone	- 1995: 10,500 switch boards in the center; 2,600 tels in district towns. 1 phone/100 people in 2000, 2.6 phones/100 people

12.1.4 Housing Situation

Housing supply is one of the most important social policies to manage urban growth. The following tables indicates the housing situation across the country based on the 1989 census data. These tables clearly show housing standard in Da Nang is unsatisfactory as well as the rest of the country although that of Da Nang is rather better than the Ha Noi and Ho Chi Minh Area.

National target of housing supply (living area) is eight (8) s.m per person in 2000. It seems that the more urbanized, the worse the housing situation is. Table 12.5 shows housing situation of Quang Ngai of 1995. The province, on average reach the national target in living area per person. On the other hand, housing area per person in the old quarters of Da Nang is around 6-7 sq. meter[1] reportedly.

Housing quality in terms of structure is illustrated in Table 12.5. As for utilities, housing situation of Ha Noi and HCMC illustrated in Table 12.6, for reference to infer those in the study area. Even though this is rather old information about housing situatuin, the overall situation is considered to have unchanged. Housing standard of the study area is also inferred unsatisfactory from this. Especially, water supply and toilet facilities are thought not to have been improved and still in substandard level.

The housings in the study area are old and dilapidated, and sub-standard, and the problems are summarized as below.

- Facilities: Water supply, lighting, toilet facilities: There still many houses which are not equipped with piped water supply, electric lighting, and toilet facilities.
- Area: International minimum standard is 30 sq.m for a family of five. However, in Vietnam, as shown in the tables, many households live in critical situation.
- Structure: There still are temporary structured houses, which consists of units mainly built of wood, bamboo, leaves and other materials of a temporary nature.

Table 12.3 Distribution of Households by Size of Living Area per Person (Urban) 1989

(unit: percentage of households)

Area (sq.m)	19 Provinces surveyed	Ha Noi	HCMC	Hai Phong	Da Nang
2 or less	5.4	7.1	7.9	5.9	5.9
2 - 4	21.3	28.9	18.4	29.3	22.1
4 - 6	24.0	27.6	19.2	31.7	24.0
6 or over	49.3	36.4	54.5	33.1	48.0
Total	100.0	100.0	100.0	100.0	100.0

Source: D. Cecil Neil, "An Overview of the Housing and Urban Development Sector in Vietnam," 1994 (originally, Hna Xuat Ban Tong Ke, "Ket Qua Dieu Tra Mau Hna O, Tong Dieu Tra Dan So Vietnam 1989" (Sample Results of Housing Survey, Vietnam Population Census 1989), Ha Noi

[1]National Institute of Uban and Rural Development, Ministry of Constuction, "Improvement Plan for Constuction of the Old City Zone of Da Nang City" (tanslaed by the Study Team)

Table 12.4 Housing situation in Quang Ngai

(unit: sq. meter/person)

	Average	Solid house	Semi-solid	Others
Total	9.4	10.7	9.6	7.1
State-owned	6.4	9.1	6.0	5.7
Collective	8.6	9.7	8.3	7.7
Private	9.4	10.8	9.6	7.1
Urban	**9.3**	**10.7**	**8.9**	**7.4**
Rural	9.4	10.6	9.7	7.1
Plain area	10.1	10.7	9.6	7.1
Mountain area	5.3	9.1	7.0	5.0

Note: Figures are as of September 30, 1991.
Source: Department of Construction, Quang Ngai Province

Table 12.5 Distribution of Households by Type of Housing (Urban), 1989

(unit: percentage of households)

Area (sq.m)	19 Provinces surveyed	Ha Noi	HCMC	Hai Phong	Da Nang
Permanent	20.1	43.1	15.6	31.6	12.1
Semi-permanent	61.3	50.0	71.2	61.3	68.6
Other(Temporary)	18.6	6.9	13.2	7.1	19.3
Total	100.0	100.0	100.0	100.0	100.0

Notes: According to Tringh Duy Luan, "permanent structures are considered to be those having roofs and walls of reinforced concrete. "Semi-permanent" types are considered as those with walls of brick and roof of tiles and are considered to be able to last about twenty years. "Temporary" units are consists of units mainly built of wood, bamboo, leaves, and other materials of a temporary nature.
Source: Hna Xuat Ban Tong Ke, "Ket Qua Dieu Tra Mau Hna O, Tong Dieu Tra Dan So Vietnam 1989" (Sample Results of Housing Survey, Vietnam Population Census 1989

Table 12.6 Housing Standard in HCMC and Ha Noi Urban Area in 1989

Facilities	HCMC %(Households)	Ha Noi %(Households)
Water supply		
piped inside	73.1%	46.4%
piped outside	7.0%	45.8%
well	13.1%	61.4%
other	6.8%	1.7%
Type of lighting		
with electricity	92.8%	99.2%
without electricity	7.2%	0.8%
Toilet facilities		
with toilet	82.1%	57.2%
toilet with flushing	70.3%	36.0%
double tank	6.1%	13.1%
other	5.7%	8.2%
without toilet	17.9%	42.8%
Total	100.0%(588,954)	100.0%(234,990)

Source: Nha Xuat Ban Thong Ke

12.1.5 Telecommunications

The Viet Nam telecommunications industry is attempting to integrate itself with global communications networks. Telecommunications will play an integral role in the socio-economic development of the country. Viet Nam's telephone network covers all 53 provinces and municipalities of districts with digital switchboards. The country now has one million sets and expects to have 1.2 million sets by the end of 1996, or 1.6 sets per 100 people.

As compared with quickly increasing telephone subscribers in Ha Noi and HCMC, the Central Region stands at a relatively underdeveloped situation in the telecommunications sector. Da Nang City, which is the most advanced among the cities in the study area, has about 23,000 switchboard capacity of which about 17,000 are actually connected, whereas Hue City has only 8,000 switchboard capacity of which about 6,000 are actually connected. Dong Ha Town and Quang Ngai Town are more or less in the similar situation as Hue.

12.2 PROCEDURES OF MASTER PLAN, ZONING AND LAND USE PLAN

The procedures to make master plan, zoning and land use plan, and landuse control are shown in Figure 12.5. Master plan, land use plan, and zoning are made by authorized body, with information from the corresponding government. These plans and zoning are inspected by General Department of Land Administration (GDLA) or People's Committees according to the level of government. In this sense, land use and zoning is secured by the inspection as long as this is enforced properly.

12.2.1 Planning System

1) Urban Area

National Institute of Urban and Rural Development (NIURD), Ministry of Construction (MOC) functions as the planning agency to cities and provincial towns of national interest. It has already provided master plans including land use plan for some 500 cities and towns throughout country. The institute also is making a model for human settlements in rural areas.

2) Outside Urban Areas

General Department of Land Administration (GDLA) is administratively responsible for all land use planning outside urban areas, because agriculture is very important in the country. GDLA is responsible to make a plan based on the investigation of its own.

At commune level, the Land Management Unit carries out land use planning (changes) under circulates and guidelines issued by GDLA. At District level, GDLA doe not have guidelines for planning because of the fiscal constraints for the districts to carry out planning process. At Provincial level, before making a recommendation on the allocation of unused land, GDLA consults with organizations such as the Forestry Inventory and Planing Institute, because the planning policy including allocation of unused land of a Province is very important.

12.2.2 Land Use Control

1) National Level

At a national level the Council of Ministers is responsible for all landuse changes and controls. This responsibility has been delegated to the GDLA. The GDLA must be consulted by every department, institute, organizations or individual for land allocation or land use changes

Article 16 of the Land Law stipulates responsibilities and authorities of land use planning and zoning. Land use or zoning change procedures and responsibilities are outlined in the article. The Council of Ministers has regulated for the procedures and formalities required.

2) Province, District and Commune levels

Article 16 of the Land Law also specifies its application at Province, District and Commune levels. The GDLA planning section controls all procedures from Province to Commune level and issues guidelines for land use planning.

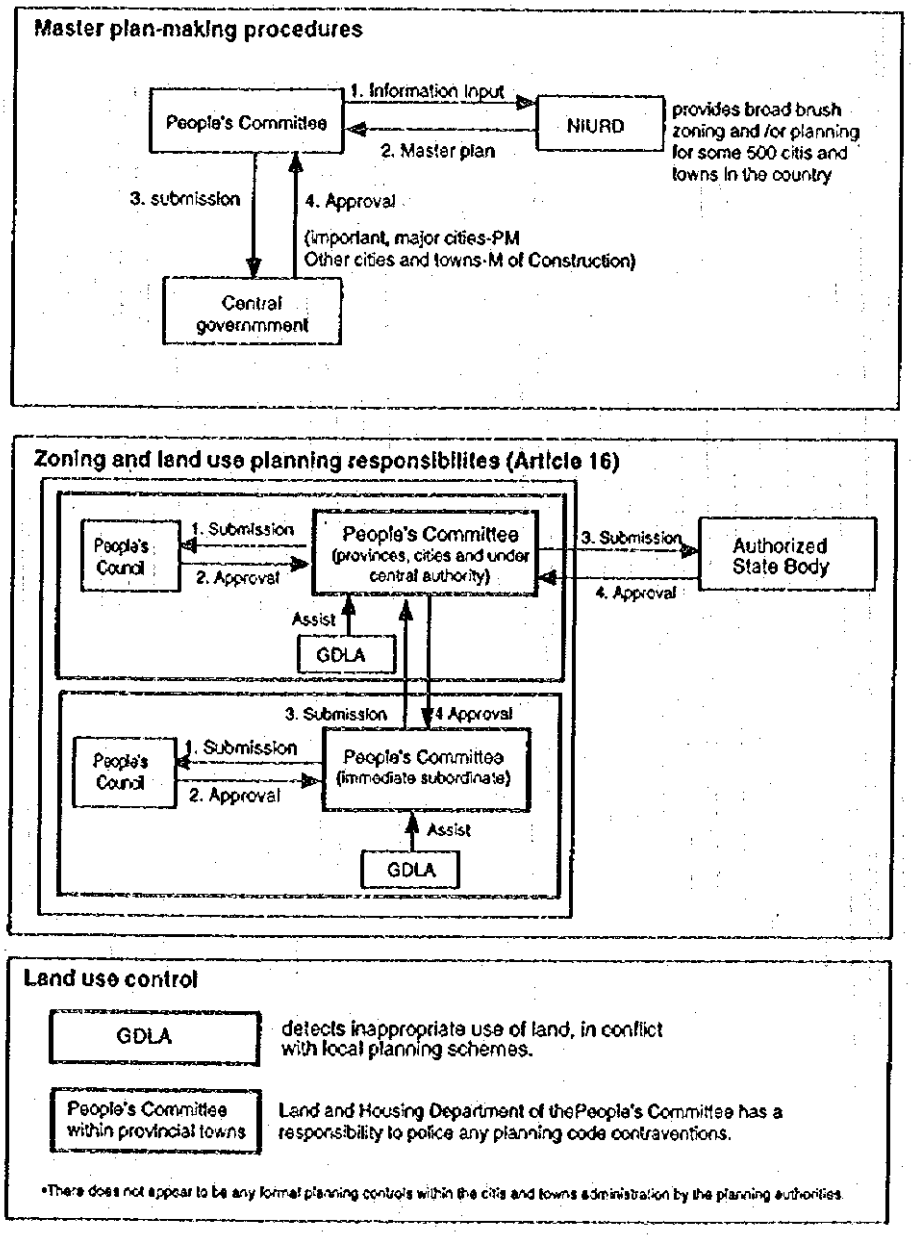
Communes that have no land use plan are forced to comply, and if necessary , they are funded by the GDLA and the Central Party.

The GDLA has inspection staff to detect inappropriate use of land from local planning schemes. Within Provincial towns, the Land and Hosing Department of the People's Committee is responsible to police any planning code contravention.

3) Building Code

NIURD currently works within modified planning guidelines for urban development, based on Russian standards. It recognized this system needs upgrading.

Figure 12.5 Procedures of Planning, Zoning and Land Use Planning



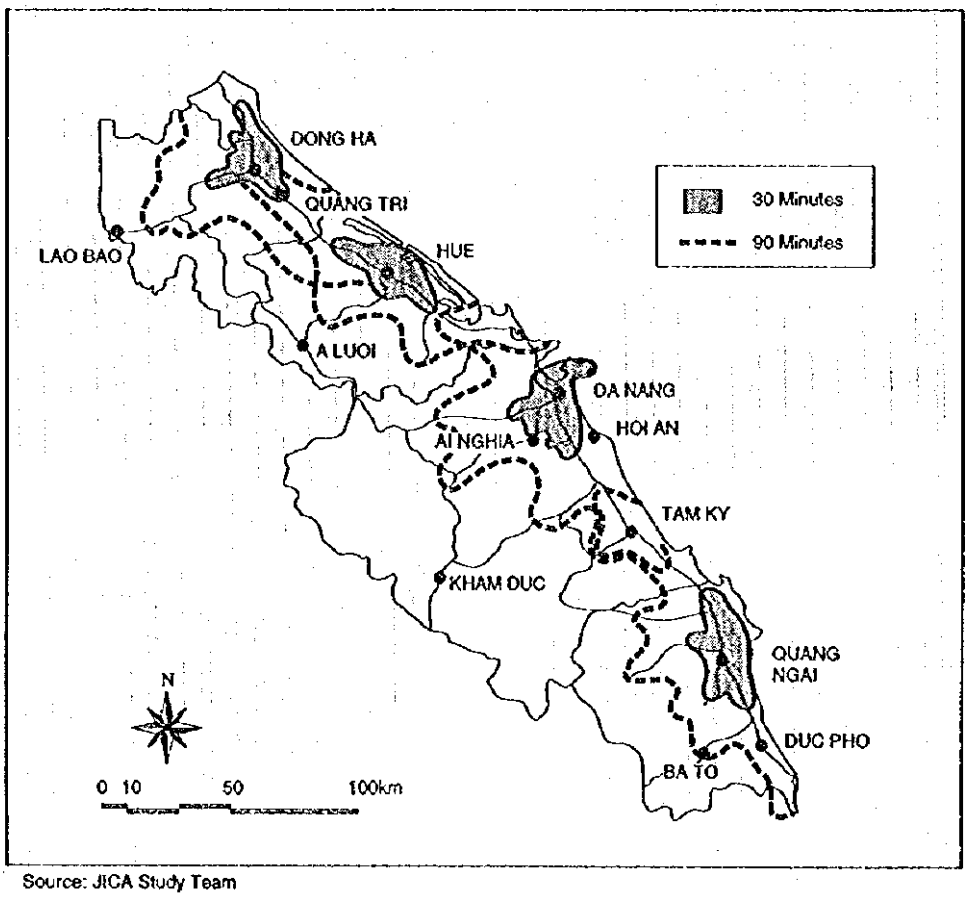
12.3 Existing Spatial Structure of Urban Centers

As already observed, Da Nang is the primacy city in the study area; Hue is the second. The two cities are the regional core and sub-core cities from the economic and social viewpoints. Besides, each province has its provincial center. Dong Ha is the provincial centerof Quang Tri province and Quang Ngai is that of Quang Ngai province although their economic performance are less than those of Da Nang and Hue.

The influence area of an urban center is identified in a sense by travel time between the urban center and its peripheral area. Figure 12.6 illustrates the 30-minute and 90-minute road travel time isochrone areas from each of the four provincial capitals. The 90-minute area may form an easy one-day business area to collect or distribute goods; the 30-minutearea be just a suburban area.

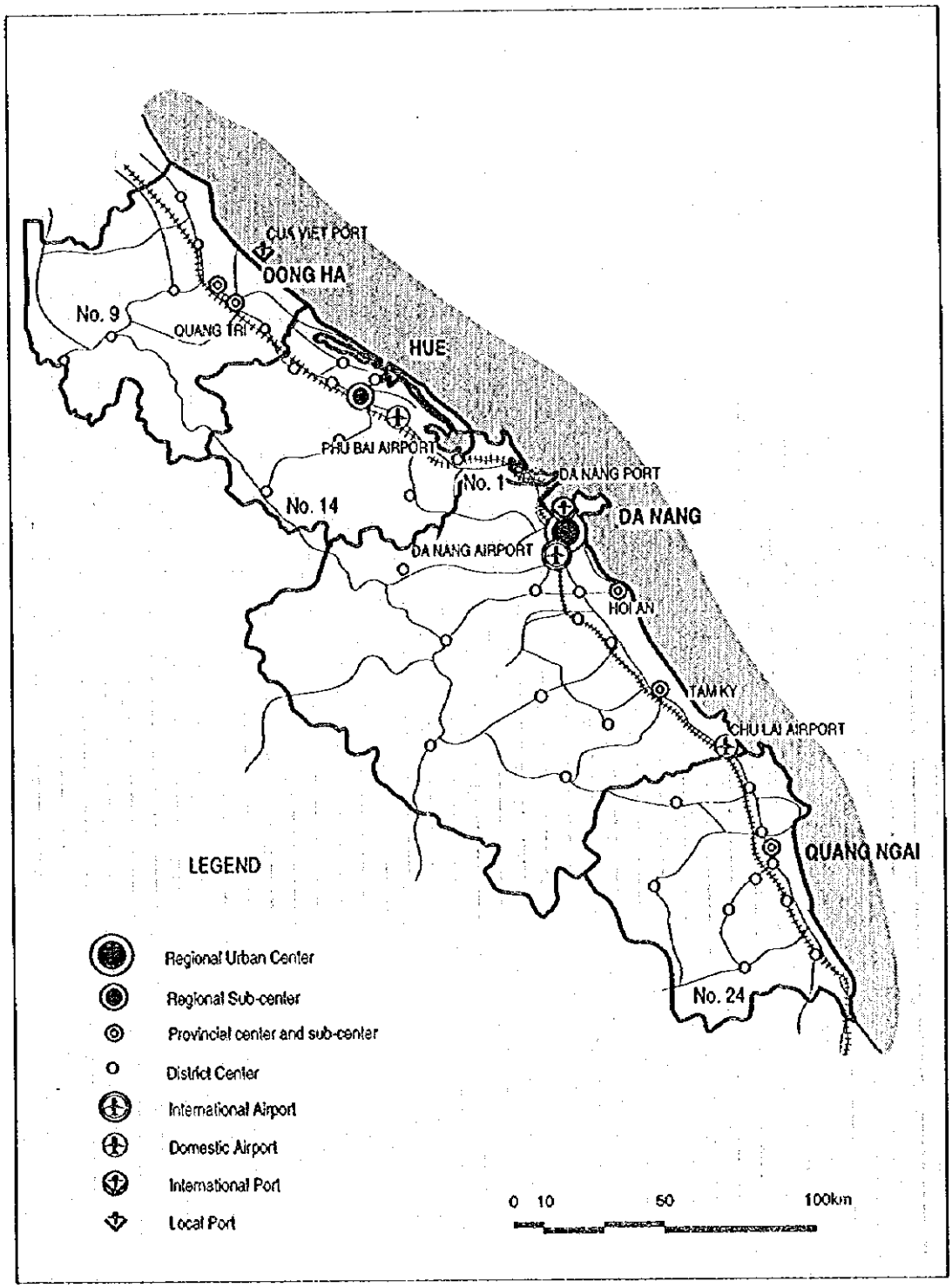
The provincial capitals of the study area host a large partof economic activities and population, thus to form urban centers in the study area. The urban centers and spatial structure of the study area is summarized as shown in Figure 12.7, which will be the core structure in the regional development context.

Figure 12.6 Travel Time Isochrone Map



Source: JICA Study Team

Figure 12.7 Spatial Structure of Urban Centers



12.4 REVIEW OF EXISTING DEVELOPMENT PLANS AND PROJECTS

12.4.1 Existing Development Plans

1) National Development Policy

Township development is described in "Strategy for Socioeconomic Stabilization and Development up to the Year 2000," as follows[2]: "The cities, provincial towns and townships are to be the economic and cultural centers, primarily industrial and commercial centers of their respective areas. The strategy for urban development is to set up many medium and small centers, logically cited, avoiding over-concentration of the population of the population in major cities." ... "To set up in these areas (certain areas important both to their respective overall regions and to the entire county) a number of zones with special administrative-economic status conductive to investment in production of goods for export and business with the outside world."

DSI's Development Orientation[3] states that the development direction of townships would be formation of medium and small centers properly so that big cities should not be over-concentrated. And the main development is focused on Hue - Da Nang -Dung Quat area while constructing small townships in the west of the region. The formation concept is to facilitate industrialization and modernization of the region's economy and industrialization of rural areas. This also prevent people from migrating to the bigger cities like Da Nang. In this development orientation, Da Nang - Dung Quat belt is designated as an industrial corridor, with a Vietnam's first oil refinery construction at Dung Quat and a new town at Van Tuong.

Core townships in the Central Region under this development concept, by Vietnamese township classification, are listed in Table 12.7. The emphasis is put on "Da Nang - Dung Quat industrial belt" in the Key Area of the Central Region. Table 12.8 shows urban centers along the industrial development belt.

Table 12.7 Population of Main Inner Cities and Townships in the Central Region

Order No.	City or town	Population ('000) (1992)	Category	Population ('000) (2010)	Category
1	**Da Nang**	450	II	900	I
2	Nha Trang	214	III	450	I
3	**Hue**	211	III	400	I
4	Qui Nhon	160	III	310	II
5	**Van Tuong**	-	-	100	III
6	Tuy Hoa	54	IV	80-85	IV
7	**Tam Ky**	46	IV	85-90	IV
8	**Dong Ha**	35	IV	55-60	III
9	**Quang Ngai**	34	IV	50-55	III

Source: DSI, "Development Orientation"

[2] Communist Party of Vietnam, "7th National Congress" Document, Vietnam Foreign Languages Publishing House, Hanoi, 1991, pp. 170-171.
[3] DSI , MPI, A copied document of "Part One: General Orientations" by DSI, collected by JICA mission for this study, pp. 35-7.

Table 12.8 Urban Centers in the Da Nang - Dung Quat Area by DSI

Order	Area	Feature	Population ('000)	
			1992	2010
1	Da Nang	Coastal center of Central Region	450	900
2	Hoi An	Ancient town	32	52
3	Vinh Dien (Dien Ban)	Agricultural district	12	19
4	Nam Phuoc (Duy Xuyen)	Agricultural district	9.8	15
5	Hoa An (Thang Binh)	Agricultural district	9.5	14.6
6	Tam Ky	South center of QN-DN	50.0	75
7	Tan An (Nui Thanh)	District capital, future industrial area	9.6	40
8	Van Tuong city	A new town, industrial area	-	100
9	Chau O (Binh Son)	Industrial district capital	8	25
10	Son Trach (Son Tinh)	Agricultural district capital	11	17.5
11	Quang Ngai	Province capital, industrial area (sugar, construction material)	103	150

Source: DSI, "Development Orientation"

2) Quang Tri

Quang Tri Province is expected to become an international nodal point in connection with Laos and Northeast of Thailand through QL 9. To this end, they are improving Cua Viet port. However, they are still low on infrastructure development both in social and industrial aspects. And infrastructure improvement is priority for their socio-economic development.

According to its "Socioeconomic Development Plan 1996-2000," the priority is put on agro-industrial development.

The provincial center is an urbanized area with the provincial capital Dong Ha Town and theold provincial town, Quang Tri Town. Dong Ha is still youg town area which was built after the division of the larger Provinces in 1989; whilst Quang Tri town was the old capital town which was devastated during war time and presently is restoring the town proprieties.

The present Dong Ha Town's plan is conentrated on development of the southern area of the Mieu Giang River while the north part will be covered by a master plan for the next five years. It is clear that infrastructure construction is priority projects for the province. Priority infrastructure investment are as follows:

- QL No.1 rehabilitation
- Hien Luong bridge
- Road to Cua Viet port
- Provincial hospital
- Cua Viet Port
- Tanut-Lalay road
- Water Drainage in Quang Tri town
- An Mo bridge

3) Thua Thien - Hue

Thua Thien-Hue is planned to be cultural and tourism center of the study area, with the world heritage, the Hue Royal Citadel and some other historical heritage. Priority in urban development is laid on improvement of infrastructure such as water, power supply, drainage, transport, environmental hygiene, squatter clearance, and pennanent settlement for fishermen in

some planned areas, and establishing of cultural institution. The province also has an idea on the building height control, population density of the inner city of Hue, the Royal citadel.

According to the Province's "Socioeconomic Development Plan for the Period 1996 - 2000," Hue City will accommodate growing population in inner city area and the west and southwest areas of the city. Tu Ha and Phu Bai along QL No.1 are planned as satellite towns of Hue City, becoming "towns". And along provincial road No. 5 towards Thuan An, along QL 49 to Binh Dien are also planned for human settlements.

Human settlements, following the national development plan, are located in Tu Ha, Phu Bi, Pho Trach, Sia, Phu Duong, Cau Hai, Nam Dong, and A Luoi. For formation of new rural economic centers at Van Trinh, Dien Hoa, An Lo, Tan My, Vinh Tanh, La Son, Lang Co, and Binh Dien, aiming at promoting industrialization in the whole province. In addition, the Province plans a large development at Chan May.

Industrialization development plan, which also influences urban structure, is as follows:

- Hue City center: mainly for light industry, services, tourism, electronics and information;
- Van Xa - Phong Thu: construction material and services industry;
- Vi Da - Tan My: fishery product and food processing, ship repair, tourism and service;
- An Cuu - Phu Bai: Agriculture and forest processing, mechanical repair, construction material production, textile, service; and
- Canh Duong- Lang Co - Bach Ma: tourism development and preparation work for the construction of deep sea port and industrial sector at Chan May.

In addition to industrial development, tourism development requires investments in hotel accommodation facilities in the province. The tourism area covers Con Hen, Thien An, Thuan An, Canh Duong, Lang Co, Bach Ma, and Ho Chi Minh route.

In order to form functional urban centers, infrastructure development is a must. The following are priority infrastructure developments related to urban development:

- Upgrading of Phu Bai airport
- Upgrading of Thuan An port
- Improving of National Railway
- Improving of QLs 1 and 49, and Provincial road No. 69
- Rehabilitation of Phu Xuan bridge
- Improvement of Traffic Congestion in Hue City
- Water supply system for Hue, Phu Bai, Thuan An, including new water plant in Tu Ha
- Telephone communication system improvement
- Rehabilitation and conservation of historical structures of Hue Royal Citadel
- Improvement of educational and medical facilities

4) Quang Nam - Da Nang

The Province has a plan to make a bigger regional commercial center of Da Nang City. The province is expected to develop several industrial zones along the "Lien Chieu - Dung Quat" Industrial belt as seen in the previous national plan. Human settlement in the province is strongly influenced by the actual industrial development.

To form functional urban center in the province, the plan states the following:

- Improvement of infrastructure and reduction of load to the existing infrastructure, and
- Mitigation of pollution in the city such as
  - Traffic control in the city
  - Dust cleaning
  - Clean port area of Da Nang City
  - Build waste treatment system
  - Construct Drainage system

Master plan of Da Nang City 2010, including a new city area of Tay Bac, was prepared by National Institute of Urban and Rural Development, Ministry of Construction, in 1993. The plan includes surrounding area of Da Nang, namely, Hoa Vang District. The city is expectedto grow to a city of 800,000 population in 2010 accompanied by industrial developments in Hoa Khanh, Thuy Tu, and Dien Ngoc - Dien Nam zones. The adjacent area is necessary to accommodate the increased population and industrial developments. Major directions of the expasion of the urban area of Da Nang City are threefold: (1) North-west (in the direction of Hai Van pass), (2) South-east (in the direction of Hoi An), and (3) South west (along QL 14).

The city's structure is planned as follows:

- The Old city area: the center of the city with administrative, commercial, cultural importance;
- City zone on the west side of the Han River: Area for residential and tourist services on the East Sea with Non Nuoc (China Beach) as international tourist center;
- New city zone (north-west): Tay Bach along Da Nang Bay including Hoa Khanh industrial zone (IZ), Thuy Tu IZ and Lien Chieu port development; and
- New city zone (south-east): Area to be developed with Dien Ngoc - Dien Nam IZ.
- To form the new city in the future, the following key projects are planned:
  - Highway development from Lien Chieu to Dung Quat
  - Hoa Khanh IZ (300ha)
  - Thuy Tu IZ (500ha)
  - Lien Chieu port (20 mil. ton/year)

Another plan on the old city area,put emphasis on the consistencywith the construction plan of New city zone of Tay Bac, andother part of the city. It covers road system, accommodation, transportation, water supply, power supply, and drainage and environmental sanitary.

5) Quang Ngai

Urban area is concentrated at and around Quang Ngai town and will expand around there. A drastic change will take place when Dung Quat Industrial Development Plan is implemented with a new town at Van Tuong. The province development plan also hasother industrial zones in West of Quang Ngai town, Tinh Phong and Pho Phong. Urban center structure will be formed with northern part of the province as core area of the province. .

In the plan, Quang Ngai town is expected to increase its population from 120,000 in 2000 and 180,000 in 2010; Van Tuong, 45,000 in 2000 and 120,000 in 2010.

12.4.2 On-going and Planned Projects and Programs

1) ODA On-going Projects and Programs

Table 12.9 summarizes on-going projects and programs in urban development sector by international development assistance.

2) Projects and Programs Needing FDI and ODA Assistance

Priority Projects listed in "Investment Projects in Vietnam to the year 2000" are as shown in Table 12.10.

Table 12.11 is a list of projects and programs expected to be funded by ODA during the period 1996-2000, which is a appendix of "Socio-economic Development and Investment Requirements for the Five Year 1996 - 2000," Government Report to the Consultative Group Meeting, held in Paris in 1995.

Table 12.9 ODA On-Going Projects and Programs

Project Title	Duration	Country/ donor (Exec. agency)	Total commitment	Project objectives (Beneficiary institution)
Water Project in Hue (Phase I)	92-94	FA/DREE (DREE)	1,773	Supply of Equipment to rehabilitate and extend the Hue water supply system (Thua Thien-Hue People's Committee)
Water Project in Hue (Phase II)	93-95	FA/DREE (DREE)	1,898	Prepare a master plan for the water distribution network in Hue. (Thua Thien-Hue People's Committee)
Water Project in Hue (Phase III)	94-95	FA/DREE (DREE)	2,310	Revamping of drinking water system (Thua Thien-Hue People's Committee)
Water Project in Da Nang	93-95	FA/DREE (DREE)	1,898	Undertake the water distribution network in Da Nang. (Quang Nam-Da Nam People's Committee)
Trang Tien Bridge in Hue	94-95	FRA/DREE (DREE)	2,488	Renovation and repair of Trang Tien Bridge in Hue (Thua Thien - Hue People's Committee
Road and Transport Infrastructure Project	91-94	UNCDF (UNDP)	4,911	Improve overall accessibility and reduce transport costs between Dai Loc district (where implementation of UNCDF program takes place) and Da Nang City. (Department of Transport an Communication, QN-DN)
Strengthening Capabilities in Building Quality Inspection	92-94	UNDP (SDDBQI)	550	Improve the capability of the State Department for Design and Building Quality Inspection in control of quality in building design and structural stability of building and standards; training on modern methodologies and techniques and technology throughout the country. (State Department for Design and Building Quality Inspection)
Support to the Urban Sector	94-95	UNDP (UNCHS)	264	To assist the government in formulating a comprehensive program for urban development, including complete urban profile for Vietnam and a strategy for urban management capacity building for the People's Committees in Ha Noi and HCMC. The project will be undertaken with the collaboration of ADB which is proving an additional US$270,000 for similar activities. (State Planning Committee)
Urbanization and Urban Management	94-94	CAN/CIDA	70	Linkage project between the Quebec Professional Association of Urban Planners and the National Institute of Urban and Rural Planning to provide training in urban management and urban land tax. (Ministry of Construction)

Source: UNDP, "Development Cooperation: Viet Nam," 1994 Report, Oct. 1995, Ha Noi

Table 12.10 Projects and Programs Expected to be Funded by ODA

Project	Description	Est. cost (mill.US$)
• Dong Ha Hotel	Newly built hotel serving tourists, conferences (home and international)	3
• Reconstruction and of water supply system in Dong Ha	Supply the town with water for daily life Site: Dong Ha chief town	2.6
• Water supply system for Quang Tri town	Supply the town with water for daily life Site: West Dong Ha town	1.1
• Sewage system in Dong Ha town	Sewage of surface water and waste water within Dong Ha town Site: Dong Ha town	2
• Reconstruction and upgrading of Thuan An port, Hue		
• Construction of a bridge across the Han River, Da Nang	JV: QN-DN Transportation Dept.	
• Upgrading or building of hotels in Da Nang	- Bach Dang (Hotel entertainment area) - Nam O (tourist village) - Da Nang Hotel - Ngu Hanh Son Hotel - Thai Binh Duong Hotel - Cua Dai Hotel (Hoi An) - Central Hotel	
• Construction of electric network in Quang Ngai town	A 10 MVA power network	3
• Investment to Son Tra Hotel	150 beds	1
• Construction of a dike for Quang Ngai town	Anti-flood in Quang Ngai town	1
• Expansion of water supply network in Quang Ngai town	2000 cu.m/day	3.5

Source: SPC, "Investment Projects in Vietnam to the year 2000", Ha Noi, 1994

Table 12.11 Projects listed for CG Meeting

Project	capacity	Duration	Total Investment (mill. US$)	Committed
• Hue Power distribution system rehabilitation		96-97	6.00	France
• QL No. 1				
- Vinh - Dang Ha	290 km	97-2000	120.0	WB
- Dang Ha - Nha Trang	689 km	97-2000	45	ADB
• Roads No 14B	280 km	96-2000	150.0	GMS
• Da Nang port		96 - 2000	14.0	
• Building of Lien Chieu - Dung Quat port	6 million tons/year	96 - 2000	300.0	
• Water supply in Ha Noi - Hai Phong - Quang Ninh - Da Nang		96 - 2000	200.0	WB, Finland, Denmark
• Water supply for Da Nang City		96 - 2000	3	France
• Water supply for Quang Ngai town		97 -99	3.5	UK
• Hue University		96 - 2000	20.0	
• Da Nang University		96 - 2000	20.0	
• Hue heritage preservation		96 - 2010	10.0	
• Hoi An ancient town		96	2.0	

Note: GMS denotes Greater Mekong Sub-Region

Source: Socialist Republic of Vietnam, "Socio-economic Development and Investment Requirements for the Five Years 1996 - 2000: Government Report to the Consultative Group Meeting," Ha Noi, Oct. 1995.

12.5 DEVELOPMENT ISSUES

12.5.1 Urban Development Potentials and Constraints

1) Potential

- Locational advantage: The study area is located on the strategic location of the Greater Mekong Sub-region located on the east edge through east-west corridor of the region, especially to Laos and North-eastern Thailand. This is one of biggest advantage to develop this area. This will stimulate and further develop the trade and commercial activities, thus urban functions.
- Rich tourism resources: Tourism is one of the leading sectors in the study area. Urban development in connection with this sector will be a big potential and vehicle to develop urban areas. TT-Hue is endowed with rich historical, cultural and natural tourism resources, such as Hue Royal Citadel, Bach Ma national forest, and Lang Co Beach. In QN-DN, there are plenty of tourism resources like China Beach (Non Nuoc), Cham heritage, Marble Mountain, Tien Sa mountain, etc., that will make good amenity to urban life. Hoi An and My son are aother major tourist desinations.
- On-going and proposed Industrial development: With rich industrial resources including minerals to industrial crops, urban development of the area will progress. Also a big project of "Chan May FTZ Development" and "Dung Quat Industrial Development" will require new urban area development.
- Transportation network: There are international and local airports (Da Nang international airport, Phu Bai airport) and seaports (Tien Sa port, the planned Dung Quat port, Chan May port). Also, road network and railway is running through the area.
- Existing Urban functions in Da Nang City: As regional center of service and industrial activities, further intensification of urban functions of the city is expected to facilitate the Area's industrialization and modernization linking with other urban centers and small and medium towns scattered in rural areas.
- Natural Settings and Urban Area: Unlike Ha Noi and HCMC, Da Nang has natural beauty, namely, "beautiful sea and mountains." This will be a strongsales-point of Da Nang appealing to outside. Also, Hue has Historic heritage, the Huong River and mountains, which is also to make a good urban amenity. Also,national park including Back Ma and Bana has a great potential as highland resort near urban area.

2) Constraints

- Insufficient infrastructure: The area is still lack in socio-economi infrastructure. Insufficient infrastructure hampers the Area's urban development led by industrial, trade, and tourism development.
- Natural Disaster: The study area is frequently attacked by typhoon which causes flood all over the low land area. The vulnerability to flood is a big constraints to urban development as well as other developments.
- Inadequate urban land use control: Cadastral mappings is a priority project. And also the land use management by a proper law enforcement is necessary for a healthy urban development to maintain a amenity and good urban environment.
- Over-concentration in Da Nang City: The old city area of Da Nang is very densely inhabited as much as more than 700 persons/ha. The zone is also a commercial and

business area of the city. The crowdedness hampered the healthy, physical urban development. It causes a traffic jam in the zone and prevent an efficient economic activities. To make the zone function properly, the well-planned land use with proper density control is necessary. As Da Nang is a smaller urban center than Ha Noiand Ho Chi Minh, the urban agglomeration is necessary tohave a wide variety of business activities attract more investment.

- Hai Van pass: Hai Van pass is a kind of obstacle to connect Hue andDa Nang to form an urban conurbation. This also is a bottleneck in road transportation. Hai Van tunnel has been studied by the World Bank.
- Degrading urban environment: Urban environment is being degraded: air pollution caused by motor-traffic and industry, water pollution by industrial wastes, domestic waste and garbage dumped, and car noise.
- Insufficient capability of urban development staff: As UNDP gives a training project of staff of NIURD, Ha Noi, HCMC, planning staff ability is insufficient. This applies to the staff in the study area, who are consulting the NIURD for their master planning process.

12.5.2 Development Issues

The following are the urban development related issues in the study area.

Issues	Description
• Development of Infrastructure:	• Social and economic infrastructure is not sufficient as mentioned in the respective chapters. Improvement and development of the socio-economic infrastructure is a key issue of the area as a whole.
	• This is related to service population of each social service, and the balance of supply side and demand side of each of the infrastructure, including fund sources. In this line, population management of cities and towns should be considered.
• Growth Management:	• Adverse impacts on environmental, social, and financial aspects by urbanization and industrialization should be minimized. This is especially a big issue in Da Nang City which already is suffering from over-population in the central zone.
	• Overpopulation requires de-centralization of population, then a coherent unified development plan including surrounding areas is strongly needed.
	• Balanced development of infrastructure and urbanization is necessary to keep the moderate pace of urbanization.
• Urban environmental management and control	• Adverse impact as the listed below on environment by industrialization, motorization and everyday living should be mitigated::

	- Air quality - Water quality - Solid waste treatment - Soil erosion - Others
	• Environmental control system should be operational in monitoring and enforcement of regulations.
	• This includes urban amenity like landscape, street-scape, and other urban design.
	• Enlightment of People's awareness of "beautification" is necessary.
• Urban traffic management	• Urban traffic congestion are serious in Da Nang, Hue, and Hoi An even though not as bad as cities like Ha Noi and Ho Chi Minh congested with cyclos, bicycles, motorbikes, and cars. Without any measures to this, traffic conditions in the urban areas of the study area will be worsen to cause environmental problems and economic inefficiency.
	• In the future, urban areas like Da Nang and Hue would require mass transit systems in inner urban area and commuting system.
	• Traffic cell or restricted zone system may be introduced in Hue, Hoi An tourism areas.
• Urbanizatioan and Human Settlements	• Urbanization in the study area area ocncentrated in the four provincial capitals in a way that each of them has a weak relation with each other and closed influence area. Moreover, there are gaps in size of econmies among the four provincial capitals. However, to drive the region's economic growth as a whole, the functional division based and likage to supplement to each other should be fromulated on the local resouces.
	• Relating to urban growth management and time frame of urbanization process, the study area must be considered with urban hierarchy and urban core system consisting of the primary, secondary, tertiary urban centers. Also to meet the governmental policy of development of small and medium sized towns, such structure must be attained.
	• In accordance with the stratified urban development, the adjacent rural area must be integrated into the one coherent development area. The relation of the rural and urban areas is perhaps based on their economic linkage.
	• To mitigate overpopulation of a city, a considerable attention must be paid to a combination of planning a new satellite city area and developing of other small town in expanding the urban areas.

• Amenity creation and Heritage conservation	• It is necessary to maintain the landscape, townscape and street-scape of the historical and cultural heritage in Da Nang, Hue and Hoi An, and other urban areas. This will give more value to the cities and towns, and thus give better images of the areas. • It is importat to create recreational facilities, including city parks and waterfront development to put more amenity in urban areas so that investments and visitors are attracted.
• Urban development personnel training	• As pointed out often with some related on-going projects, urban development personnel is not capable in planning and managing urban development. The personnel must be trained and developed.

12.6 DEVELOPMENT PLAN

12.6.1 Development Strategies

1) Vitalization of Urban Econmy

Urbn economy will become an engine of the regional economy. Urban economy should be vitalized so as to realize the regional development objetives and give spill-over effect to rural area. Development efforts should be made in:

- Attraction of FDI and other external funds
- Development and diversification of industries and services
- Improvement of econmic infrastructure

Focul areas of the urban econmy are as follows:

Industrial and tourism development in urban area have clear-cut purposes, i.e., increase in regional income and generation of more employment opportunities.

Based on the development potential and constraints in industries, agro-industries, manufacturing, some heavy industries and tourism sectors have potential to develop. Also, the strategic location gives the study area a potential to create a special trade zone, that is, a free trade zone.

Diversification of economic activities in the service sector needs both horizontal and vertical expansion of urban services as well as industrial sectoral activities. The horizaontal expansion means the process of enlarging the economic agglomeration, while the vertical expansion is likely to be subject to some some strategic policies such as encouragement of private investments on provision of the high-class facilities of hotels, convention facilities, shopping malls and residences.

2) Spatial Strcture of Human Settlement for Balanced Development

From the regional development point of view, balanced growth is important. In the present urban setting, Da Nang dominates the other urban areas and plays a central role. Urban system with Danag as a central city must be planned in a way that urban areas form a well ordered hierarchy of urban human settlements. In particular, likage between urban and rural area hould be formed.

- Balanced spatial developments based on the existingurban centers and local resources in industrial, tourism, agricultural, and other developments
- Decentralization to avoid overconcentration
- Strengtheing of urban-rural linkage (integration) through small towns by physical network and eocnomic diversification

3) Amenity City

This is aiming at better living standard and amenity in each of the urban areas to create comfortable place to live, work and visit. A great effort has to be made to create a qualityurban environment which includes the following components:

- Improvement of urban design: Urban structure plan (land use plan, zoning, and network), landscaping, street-scape, building development control, and other design of urban spaces.
- Improvement of urban environment: Improvemnt of natural environemnt, conservation of historic heritage, urban sanitation, pollution control, urban traffice management.
- Improvement of socio-economic infrastructure: Improvement of road, water, sewerage, waste treatment, power, telecommunications, housing, recreational facilities, and social services.

12.6.2 Human Settlement System

1) Urbanization

The projected population of study area in 2010 will be 6.5 million, compared to 4.8 million in 1995, while the urban population will be 2.1 million in 2010 compared to 1.1 million in 1995. Figure 12.8 and Table 12.12 shows the future urban population distribution.

2) Residential Density

Gross population density for residential area is proposed to be planned at the level of 150 persons per hectares or less. As Danag city shows the highest population density at its old town area with more than 700 persons per hectares the gross population density level for new residential area development around Da Nang City have been at around 150 persons per hectares.

Therefore, additional urbanized area which will accommodate the additional urban popualtion until 2010 are: 1,020 ha for Qunag Tri; 1,853 ha for TT - Hue; 3,173 ha for QN- Da Nang and 1,073 ha for Quang Ngai.

3) Human Settlement System of the Study Area

Deliberate growth management measures are necessary under a decentralization policy. To this end, a structured hierarchical human settlement center system at the regional level should be developed combined with hinterland development. Higher ordered centers shall be developed with higher levels of urban functions. These centers should be developed as development strategic centers for the decentralization policy in order to accommodate spill-over of urban population, urban economies and industrial activities.

The proposed human settlement center system is shown in Table 12.13, and its spatial structure, in Figure 12.8. The following should be noted as important feature of the spatial structure of the human settlement system.

Table 12.12 Future Urban Population

Area	Urban population ('000)			
	1995	2000	2005	2010
Study Area	**1,079**	**1,285**	**1,634**	**2,145**
Quang Tri Province	**91**	**123**	**170**	**244**
Dong Ha town	56	74	91	129
Quang Tri town	15	18	21	25
VinhLinh	12	16	24	36
Gio Linh	-	5	10	15
Cam Lo	-	-	5	10
Trieu Phong	-	-	5	10
Hai Lang	-	-	-	-
Huong Hoa	8	10	14	20
TT-Hue Province	**270**	**336**	**429**	**548**
Hue city	238	295	354	400
Phong Dien	-	-	-	-
Quang Dien	-	-	-	-
Huong Tra	8	10	15	21
Phu Vang	-	-	5	15
Huong Thuy	12	16	26	61
Phu Loc	11	15	30	70
Nam Dong	-	-	-	-
A Luoi	-	-	-	-
QN-Da Nang Province	**613**	**700**	**853**	**1,089**
Da Nang city	444	540	629	729
Hoi An town	20	21	25	35
Tam Ky town	36	37	50	63
Hoa Vang	15	17	52	100
Hien	2	2	2	2
Dai Loc	14	14	20	38
Dien Ban	14	14	18	50
Duy Xuyen	9	9	10	15
Giang	4	3	3	3
Que Son	7	5	5	5
Thang Binh	15	12	12	12
Hiep Duc	2	2	2	2
Phuoc Son	4	3	3	3
Tien Phuoc	5	3	3	5
Nui Thanh	11	11	12	18
Tra My	9	7	7	7
Hoang Sa	-	-	-	-
Quang Ngai Province	**105**	**132**	**185**	**266**
Quang Ngai town	52	69	95	114
Ly Son	-	-	-	-
Binh Son	7	9	25	76
Tra Bong	-	-	-	-
Son Tinh	9	12	18	25
Son Ha	-	-	-	-
Son Tay	-	-	-	-
Tu Nghia	11	14	16	20
Minh Long	-	-	-	-
Nghia Hanh	7	8	10	10
Mo Duc	8	8	9	9
Duc Pho	7	7	8	8
Ba To	4	4	4	4

Source: JICA Study Team

- The core development area is the "Hue-Da Nang Corridor" covering Hue - Chan May - Da Nang - Hoi An. This development corridor is the spine of development in the study area. The corridor contains industrial and commercial centers, a physical distribution center with the international deep seaport at Chan May to handle domestic and international cargoes and tourism promotion zones. Lao Bao shall be the Quang Tri border free trade zone.
- Da Nang is the primary order urban center, supplemented by Hue. Both will form a large development strip along QL 1, including Chan May Free Trade Zone. Dong Ha and Quang Ngai - Van Tuong - Dung Quat are the other urban centers.
- Chan May and Dung Quat are strategic development cities with new town development.
- Industrial estate developments are proposed at Cua Viet port, Dong Ha south, VanXa, Phu Bai, Lien Chieu, Hoa Khan, Dien Ngoc - Dien Nam, Dung Quat, Thinh Thong, Quang Ngai town, and Nghi Hanh.
- The spine of the road network shall be formed with a New Hue - Da Nang Highway and the Hai Van tunnels.

Table 12.13 Urban Center Hierarchy in the Study Area

Province	I Regional Center • Highly functioning urban center to support regional economy	II • Provincial Center • Functions as provincial economic center	III • Provincial Sub Urban Center • Functions as supporting provincial economic center	IV • District Center • District center to support agriculture and rural development at district level	V • Strategic Urban Center • Special functions for industrial and commercial development
Quang Tri		Dong Ha	Quang Tri Ai Tu	Ho Xa Gio Linh Dien Sanh Cam Lo Khe Sanh Ben Quan	(Lao Bao)
TT-Hue		Hue	Phu Bai Phu Loc Tu Ha	Sia Phu Tuong Nam Dong A Luoi	Chan May
QN-Da Nang	Da Nang		Hoi An Tam Ky Hoa Vang Vinh Dien Duy Xuyen	Tien Ky An Tan Ai Ngia Dong Phu Tan An Tra My Trao Khan Cuc Thanh My	
Quang Ngai		Quang Ngai	Chau O Son Tinh	La Ha Dong Cat Duc Pho Ba To Tra Xuan Son Ve	Dung Quat Van Tuong

Source: JICA team

Figure 12.8 Distribution Future Urban Population

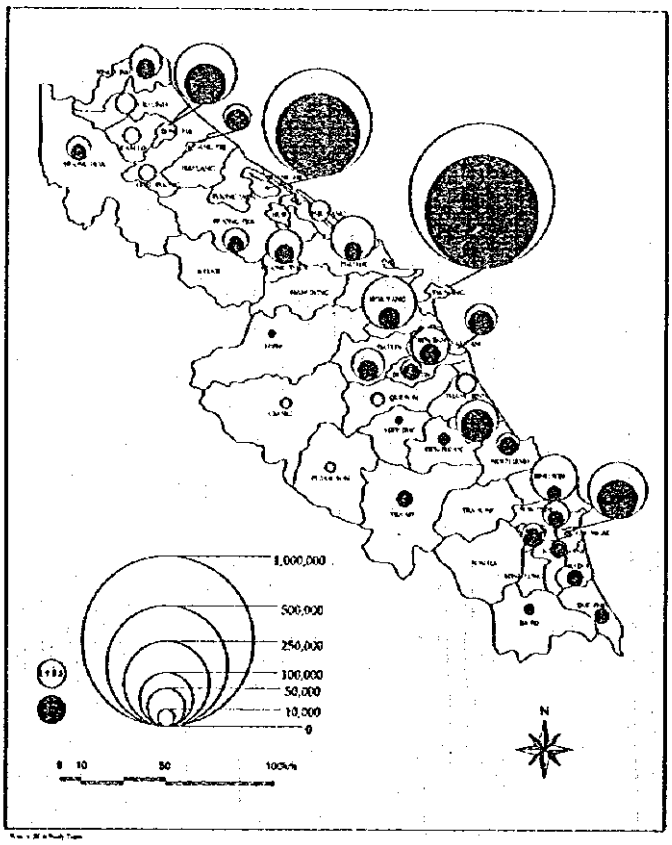
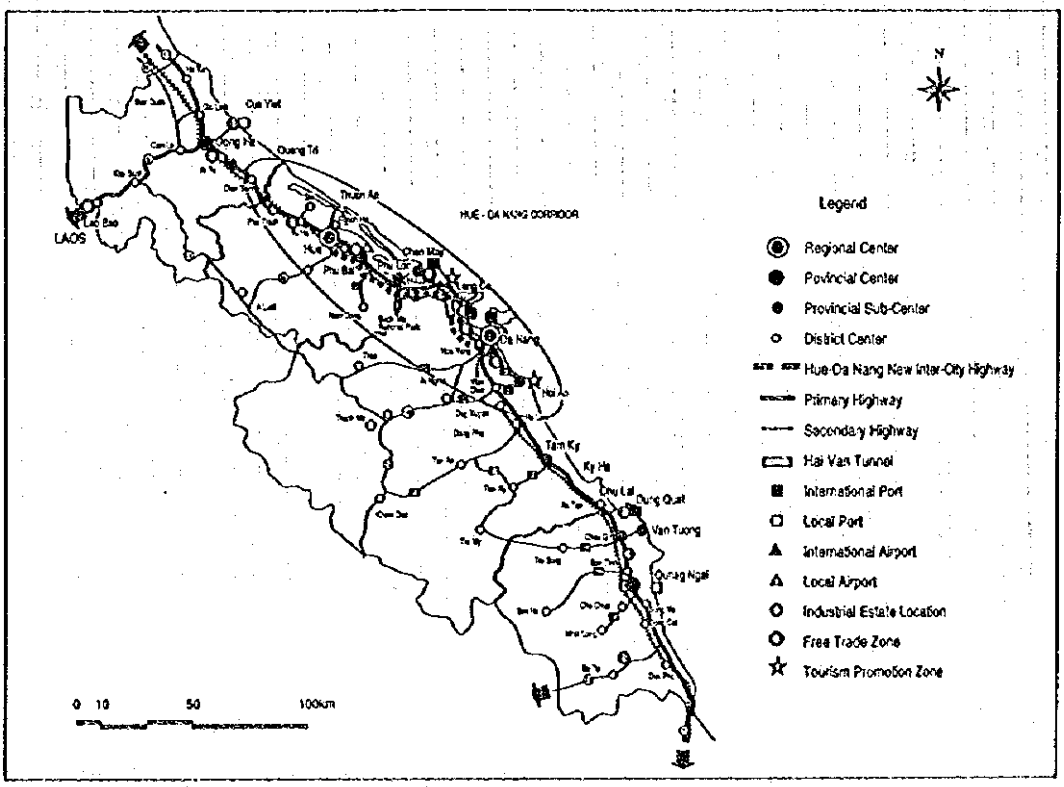


Figure 12.9 Urban Development and Spatial Structure



12.6.3 Development Plans of Major Urban Areas

The aforementioned development strategies are interpreted within the local settings of each urban area. In the study area, there are three unified urban areas to plan, namely, Dong Ha area, Hue - Chan May - Da Nang - Hoi An Corridor, and Dung Quat - Quang Ngai area.

The following are urban development concepts of the respective areas:

1) Dong Ha Area

(1) Development direction

Dong Ha is a small urban area, which has only limited urban functions and economic size compared with the three other provincial capitals. The key development idea for Dong Ha is industrialization through agro-based economic development.

First of all, the area needs to expand and grow its own economic baseto expand the urban area and accumulate urban functions. To this end, industrialization, which is accompanied by urbanization should be realized as stated in the industrial development section of this volume. Industrial developments are proposed at Dong Ha south and Cua Viet port. At the same time, the Lao Bao Border Free Trade Zone development project is proposed to tap the Greater Mekong Sub-Region's trade activities. Economic growth by these projects is the key to the Province's grown. Otherwise, Dong Ha area will not be modernized and urbanized as expected.

Furthermore it is proposed to establish a border Free Trade Zone at Lao Bao on the Lao border to accelerate the trade with Laos and Thailand. Quang Tri and QL 9 is expected to be a free trade corridor.

(2) Development plan

The expansion of the human settlement area must be just adjacent to the existing urban inhabited land in Dong Ha area because infrastructure development cannot catch up with the pace of the expansion, if development takes place in a disorderly manner.

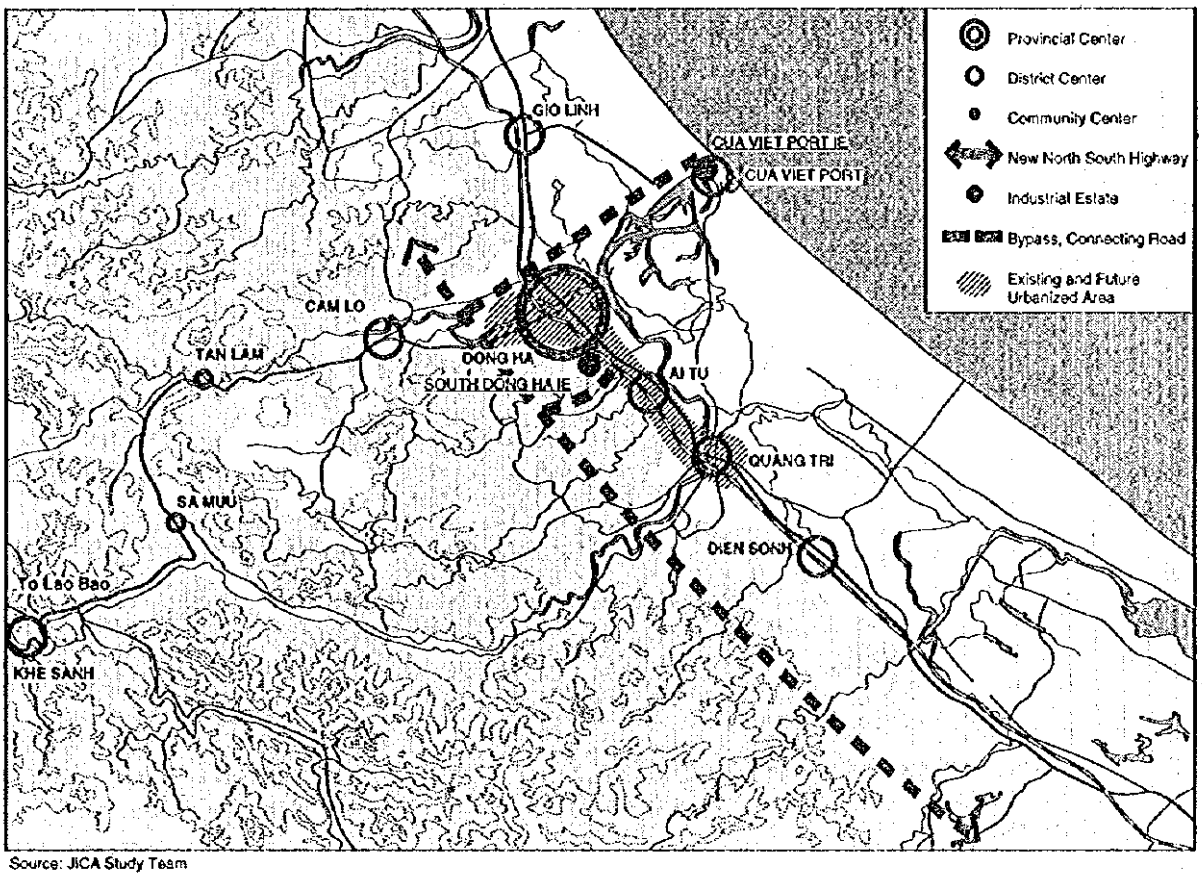
Human settlements are planned to be mainly along QL 1, between Dong Ha, Ai Tu and Quang Tri. The other district towns along QL 9 are expected to grow as the Quang Tri Free Trade Zone Corridor plays the expected role in economic activities. The Lao Bao Boarder FTZ is also proposed to include light industries such as electric and electronic, textile and garment.

Development components around the Dong Ha area are as follows:

- Urbanied area: The direction of expansion of the urban area is, in the first place, southward along QL 1 towards Quang Tri town through Ai Tu. In the urbanized area, water, sewerage, road development should be first priority for improving service level of the existing infrastructure.
- Industrial zone development: Two industrial estates development are proposed at Cua Viet port and Dong Ha south areas.
  - Dong Ha South IE: Electric and electronics, and machine equipment.
  - Cua Viet Port: Foodstuff, glass and pottery, and machine equipment.
- Improvement of Cua Viet port: Cua Viet port is proposed to be improved for domestic transportation.
- Construction of access road to Cua Viet port A road connecting Dong Ha and Cua Viet port is now under construction.

- Construction of bypass: A bypass between QL 1 and 9 on the northern ring of the town area (as proposed as by TEDI) is necessary in order to avoid the traffic from Lao Bao going through downtown of Dong Ha.
- Utilities Development: The following utility projects are proposed:
  - Expansion of piped water supply system in Dong Ha and Quang Tri towns
  - Expanstion of storm water drainage in Dong Ha and Quang Tri towns
  - Reinforcement of solid waste disposal facilities in Dong Ha and Quang Tri towns
  - Development of water supply facilities and sewerage and solid waste disposal in the proposed industrial zones.

Figure 12.10 Development Plan of Dong Ha Area



Source: JICA Study Team

2) Hue-Chan May-Da Nang-Hoi An Development Corridor

(1) Development direction

This corridor is the main urban high potential development area in the study area. This area is to be the engine fo growth in the study area. Therefore, most of the development efforts will be in the corridor to form an urban agglomeration.

QL 1 and New Hue - Da Nang Highway form the spine of the corridor with the other communication systems, such as Phu Bai and Da Nang airports, Tien Sa and Chan May ports. The corridor will be connected to the hilly and mountainous areas with a ladder patterned road network system to integrate the rural and urban areas.

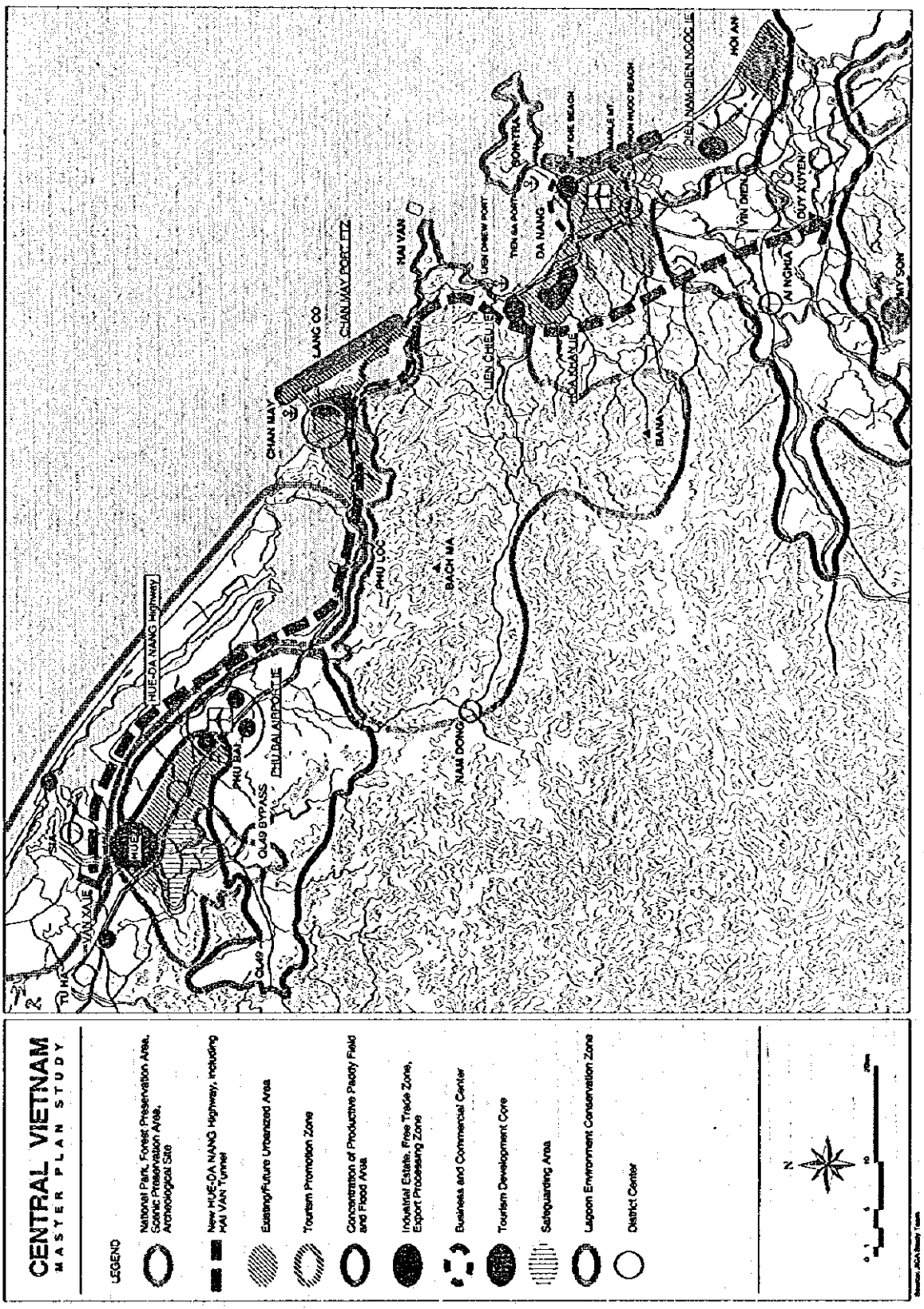
(2) Development plan

Figure 12.11 shows the land development concept. The spatial structure is formed with the New Da Nang - Hue Highway and the following developments:

The Corridor contains:

- Hue Cultural Conservation & Tourism Development Zone: this zone is to be developed as a center of cultural and educational activities. Conservation of thenatural and cultural environment together with urban amenity development should be carried out.
- Phu Bai Industrial Development Zone: Phu Bai area is proposed to be developed asan industrial area in the future. This zone has less impact on both natural and social environments. This industrial complex is proposed to include: electric and electronic, machine equipment, chemical, textile and garment industries.
- Van Xa Industrial Zone: Although this zone is just out of the Hue - Da Nang Development Corridor, this industrial zone is a development core to the northern area of T.T. Hue. This industrial estate is proposed to have light-industries, such as foodstuff, textile, garment, leather and artificial leather.
- Lagoon Environment Conservation Zone: The natural and social environment in this zone should be conserved. In conjunction with this zone, socio-economic development such as agricultural, fishery and community development.
- Chan May Free Trade Zone: This zone is proposed as a Free Trade Zone with a commercial port. Environmental consideration and types of industries location should b considered for development. The development concept is to create a new urban center to form urban agglomeration in the Central Corridor.
- Lang Co Tourism Promotion Zone: This area is proposed to be developed asa tourism promotion zone for a beach resort. Natural conservation and preservation, and prevension of pollution are keys to the development of the zone.
- Hai Van- Bach Ma National Park Area: This natural environment should be preserved.
- Da Nang Regional Center Development Zone: Da Nang is the largest urban center and gateway of the Central Region. Urban functions and amenities should be enhanced from a regional development point of view. High level of urban functions with its beautiful scenery (river, sea and mountains) will attract investment to this area. Da Nang EPZ is located in this area.
- Da Nang Coastal Tourism Development Zone: Da Nang has a potential coastal line for beach resort development. This is expected to add more value to Da Nang's urban amenity.
- Lien Chieu - Hoa Khan Industrial Development Zone: Industrial estates are planned along QL 1 on the west of Da Nang City, in which Coca Cola and Nissan are supposed to establish factories.
- Dien Ngoc - Dien Nam Industrial Development Zone: This industrial estate is proposed on low productive barren land, out of flood prone area.
- Hoi An Tourism Promotion Zone: Hoi An is a candidate of UNESCO's World Heritage. Hoi An is a proposed tourism promotion zone. Its historical and cultural environment has a potential to attract tourists. Key issue of the development is conservation of the heritage and flood mitigation measures.
- My Son Tourism Development Zone: My Son is also a candidate of UNESCO's World Heritage. This zone is proposed to be a "National Archaeological Park" development area as tourism destination with better access and programs to preserve Cham ruins including the surrounding holy mountains.

Figure 12.11 Development Concept of Hue-Chan May- Da Nang-Hoi-An Corridor



3) Hue Area

(1) Development direction

As it is a World Heritage city, Hue shall be protected and developed as a historic, cultural and tourism core. Hue's City image is clearly related to its historic and cultural heritage and the Huong River. Its landscape is a great asset for the city's identity. To maintain, rather improve its image, Hue should be totally planned and controlled in its design.

Although Hue will be developed as a cultural and historical city, the urban area will also be developed along QL 1, with industrial development at Phu Bai and Van Xa. To form a larger unified urban area, the new Hue-Da Nang Inter-city Highway is proposed to run east-west north of the Hue Royal Citadel.

Furthermore, Thuan An is proposed to be developed as a beach resort with lagoon conservation. Accordingly, a road connection between Thuan An and Hue will be needed.

(2) Development plan

Development elements for Hue are as follows:

- Cultural landscape and zoning: Hue is proposed to be zoned as follows:
  - Historic Preservation Zone: This zone aims at preserving the assets with a restoration program, which covers most of the Hue historic heritage, the pagodas, temples and the Royal Palace.
  - Historic Conservation Zone: This zone aims at conserving the environment of the assets, covering Hue Royal Citadel, and the southern bank of the Huong River surrounding the pagodas and temples.
  - Historic-scape Safeguarding Zone: This zone aims at forming and retaining the unique historic and cultural atmosphere, conserving "cultural landscape" consisting of traditional vernacular villages, rural temples and the natural environment. In this zone, strict zoning and land use regulations should be formulated to preserve the traditional environmental context of the historical monuments and sites with buffer zones.
  - Riverside Control Zone: This zone aims at preserving the environment of the Huong River Basin. In addition, the Huong River has a potential to develop a waterfront park and promenade to enhance its urban amenity together with the historical and cultural atmosphere, especially in front of the business district and the Royal Citadel. At the same time, rehabilitation of Phu Xuan Bridge is proposed.

Table 12.14 Proposed Zoning System and Items to Control in Hue

Proposed zones	Items to control						
	Bldg Height	Bldg Use	Land	Deve-lopm't facility	Advert-izement signs	Sanita-tion	Land use
Historic Preservation	-	-	-	-	-	▲	▲
Historic Conservation	❑	-	❑	❑	-	▲	★
Historic-scape Safeguarding	O	❑	❑	O	❑	★	★
Riverside Control	❑	-	❑	❑	-	★	★
Roadside Control	❑	-	❑	❑	❑	▲	★

Note: ★: necessary; O: allowable; ❑: conditionally allowable; ▲: not applicable ✖: not allowable
Source: JICA Study Team

- Hue Royal Citadel Urban Environment Improvement: The Royal Citadel is a special asset. In this area, an urban environment improvement program is proposed to be

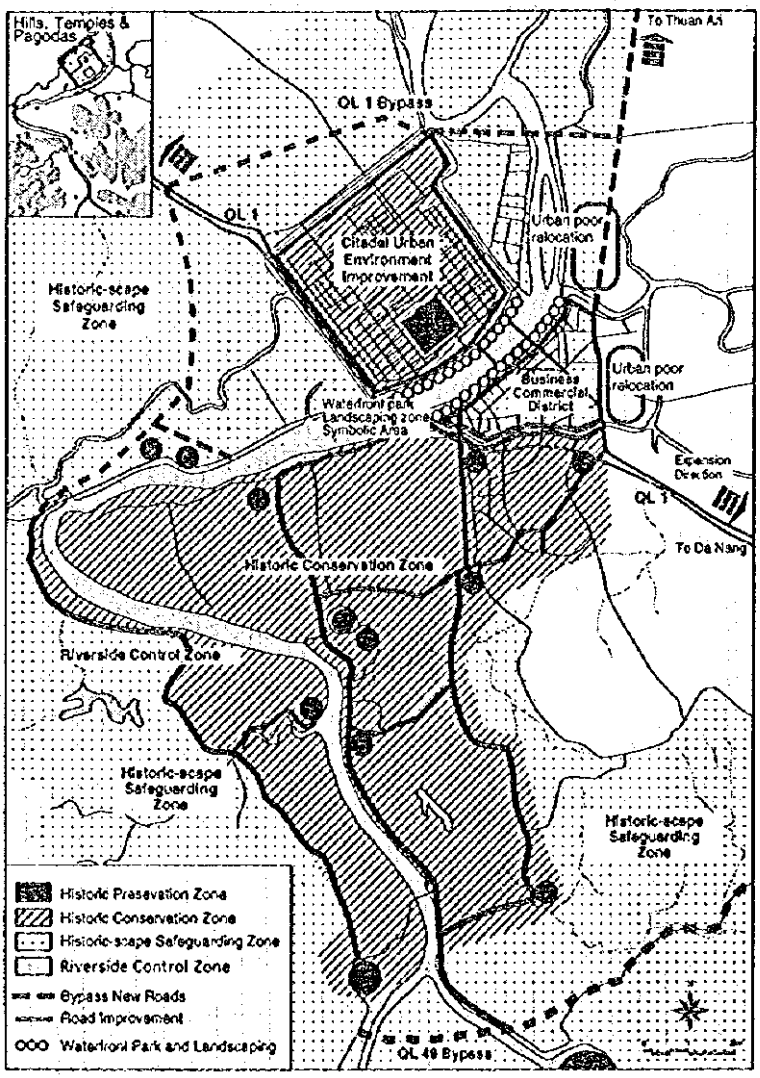
carried out. The program includes the total urban environment, such as urban sanitation, street development, flood control, sewerage management, and building control.

- Business District: The business district is confined on the existing business district and a strip of land along QL 1.
- Urban poor resettlement: There live some ten thousand people on the wall of the Citadel and on river boats. The former squats and the latter have an adverse impact on the river environment. It is planned to move them to the new residential area on the east part of Hue City.
- New Hue-Da Nang Highway: The new Hue-Da Nang inter-city Highway is proposed to run on the north part of Hue east to west.
- Bypasses construction: The following bypasses need to be constructed to avoid through traffic. They also help the traffic congestion in the downtown and mitigate air pollution.
  - QL 49 bypass: To avoid the traffic through the safeguard area, proposed scenic and cultural preservation area.
- Tourism related road improvement: The following roads are proposed to be improved for tourism development purpose.
  - Ho Quyen - Le Loi Street. - Nam Giao
  - Mauseleums and Pagodas access roads
  - Tu Duc, Duc Duc, Hon Chen access roads
  - Provincial Highway 5 - Thuan An access road
  - Thuan An beach roads
  - Thien Mu Pagoda bypass road: A local road running between Thien Mu pagoda and the Huong River, disturbing tourism environment from jetty on the Huong River to the pagoda. A bypass road is proposed behind the Thien Mu pagoda.
  - Provincial Highways 3 and 5
- Utilities development: The following utilites development is proposed:

  In Hue City:
  - Sewerage improvement project in the Citadel,
  - Expansion and rehabiitation of water supply facilities,
  - Expansion of sewerage system, and
  - Reinforcement of solid waste treatment capability.

  Other areas:
  - Development of piped-water supply facilities in Huong Thuy and Phu Loc,
  - Development of water supply facilites, sewerage and solid waste disposal facilities in Lang Co, and
  - Development of water supply facilities, sewerage and solid waste disposal facilities in the proposed industrial zones in Phu Bai and Chan May.

Figure 12.12 Hue Area Development



4) Chan May Area

(1) Development direction

It is proposed that the Chan May area forms a logistics base with a free trade zone and commercial port facility so as to serve as marine gateway in the New East - West Trade Corridor of the Greater Mekong Sub-Region (GMSR). This also aims at creating an attractive environment for FDI, and a comparatively advantageous international trade and processing base.

Chan May is supposed to be the core development area of the "Hue-Da Nang Development Corridor."

(2) Development plan

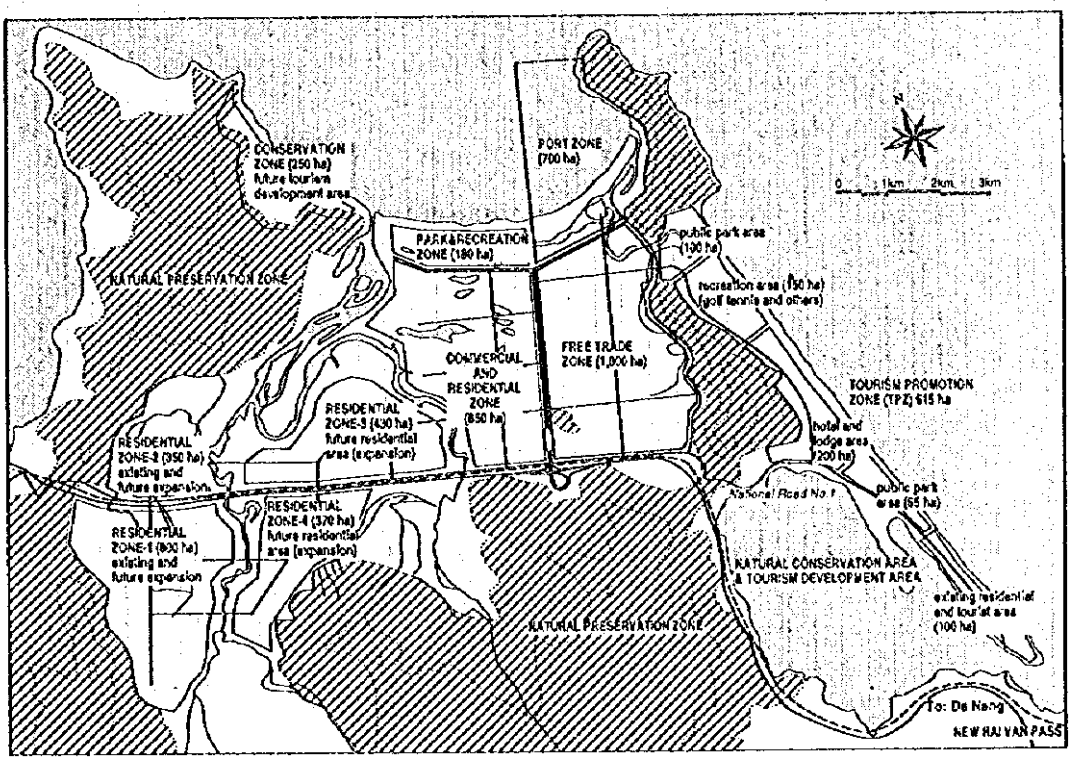
Figure 12.13 shows the preliminary development plan of the Chan May Area including Lang Co Area. Chan May is naturally suitable as port area with beautiful sea. Although the detailed development plan needs further study, the preliminary development plan for the Chan May consists of the following zones:

- Port zone,
- Free trade zone: the FTZ will include assembling and/or processing bydistributor's type of industries, such as construction material, chemical, wood processing, textile, garment, foodstuff, electric and electronics, and handicraft,
- Commercial and residential zone,
- Park and recreation zone,
- Residential zone,
- Conservation zone,
- Natural preservation zone,
- Natural conservation and tourism development area, and
- Tourism promotion zone.

Roads are to be networked with the Hue-Da Nang New Inter-city Highway as an arterial road and grid feeders in the project area.

Some 50,000 people are estimated to live in 2010 in the area including the existing population.

Figure 12.13 Chan May Development Plan



5) Da Nang Area

(1) Development direction

Da Nang is the "Gateway City "of the region. Creation of the "Gateway City of Da Nang"with high urban functions and amenity with its beautiful scenery is the key development concept. Da Nang's asset in urban design is its sea and mountains, which neither Ha Noinor HCMC has. In design of the city, it is vital to make best use of the settings and ameliorate the degrading urban environment.

As economic center, emphasis should be put on the following developments:

- Business and Commercial Area Development
- Industrial Development
- Tourism Development

Furthermore, decentralization of Da Nang City is a big issue. A well planned development is needed to accommodate the over-spilt population. Such urban development must be on land which is not highly productive and prone to floods. Therefore, the direction of the expansion of urban area of Da Nang City is towards the west part of the City and adjacent area of Hoa Vang, and southeast area on the way to Hoi An.

(2) Development plan

Figure 12.14 illustrates the development concepts for the Da Nang area. The following are the key development components:

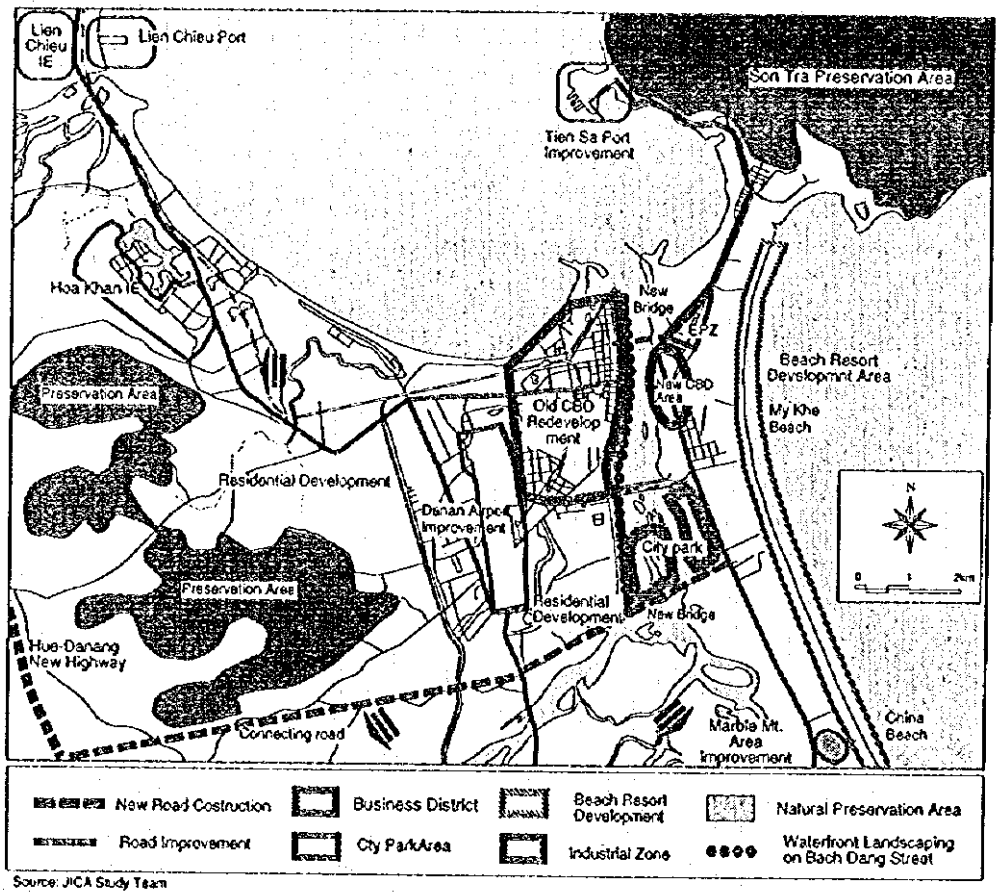
- Business district with urban amenity: The central business district of Da Nang is proposed to be developed with good landscaping, with emphasis on waterfront development of Bach Dang Street and the Han River. In the far future, a new CBD concept of twin CBDs comprising Bach Dang street and Tien Sa across the Han River is proposed with a view to create new Da Nang central business zone. In the very far future, a new bridge for business use connecting these two CBD is also proposed. The CBD on Tien Sa is to have resort atmosphere with beaches on the Eastern Sea behind it.
- Industrial zones development: The existing Da Nang EPZ, located on the east bank of the Han River is the first priority to proceed. Location of the industrial zones are planned on low productive land 10-15km away from the downtown Da Nang, namely, Lien Chieu, Hoa Khan, and Dien Ngoc - Dien Nam. Accompanied with these industrial developments, an appropriate transportation network should be ensured to avoid a traffic bottleneck between Tien Sa port. The following types of industries are proposed for the industrial zones.
  - Da Nang EPZ: Machine equipment, electric and electronic, textile, and garment,
  - Lien Chieu and Hoa Khan: Machine equipment, metal production, chemical, construction material, foodstuff, glass and pottery, and wood processing and forestry, and
  - Dien Ngoc - Dien Nam: Chemical, electric and electronic, textile and garment.
- Residential area: To mitigate the overpopulated inner area and accommodate the future population, residential area development is indispensable. The development direction would be towards west, south-east, and south. The new residential area should be developed on low-productive land.
- Natural preservation area: Son Tra peninsular and mountain area on the west to the City should be preserved for environmental and landscape purposes.

- Tourism development and urban amenity: Da Nang's important asset is tourism resources, which are close to the downtown, including beaches, mountains, and historical spots. Urban design and tourism development should be planned in a unified manner to create urban amenity. To enhance the urban amenity of the gateway city, Bach Dang Street should be improved with waterfront landscaping.
- Road network development: The new Hue-Da Nang Highway, bypasses, city transportation and river crossing are proposed to structure the greater Da Nang area. The urban road network, including crossing over the Han River, which will serve as a smooth connection between Tien Sa port with the other areas of the City. Also, the roads connecting suburban areas with Da Nang are proposed for the purposes of tourism and industrial development.
- Bridge construction: A new bridge over the Han River south of the existing bridge (Ngen Van Troi Bridge) is necessary to accommodate both, increasing volume of cargoes generated at the planned industrial estates and tourist traffic. Also the existing bridge needs to be upgraded to accommodate growing volume of cargoes. Furthermore, a river-crossing on CBD area will be proposed in the long run, whose location and alignment need further study.
- Improvement of Da Nang Airport: As the main gate to the Gateway City, Da Nang Airport needs to be improved in passenger and cargo handling capabilities.
- Road improvement: The following roads are proposed to be improved for both industrial and tourism purposes:
  - Da Nang City - QL 1 - TL 608 (Hoi An access),
  - Da Nang City - TL 603 - TL 607 (Hoi An access),
  - Da Nang City - TL 603 - Local coastal road (DL),
  - The Han River - Marble Mountain, and
  - Kiem Lien village - Southside of Lang Co.
- Public park: A public park is proposed on the river-front of the Han River, south of Nguyen Van Troi bridge. This will be a recreational space for both Da Nang people and tourists.
- Mitigation of pollution in the city: The city needs the following measures to mitigate pollution:
  - Traffic control,
  - Dust cleaning,
  - Clean port area,
  - Waste treatment system construction, and
  - Drainage system construction.
- Utilities development: The following utilities are proposed in the Da Nang area:

  Da Nang:
  - Rehabilitation of water supply facilities,
  - Development of a sewerage system, and
  - Reinforcement of solid waste disposal facility.

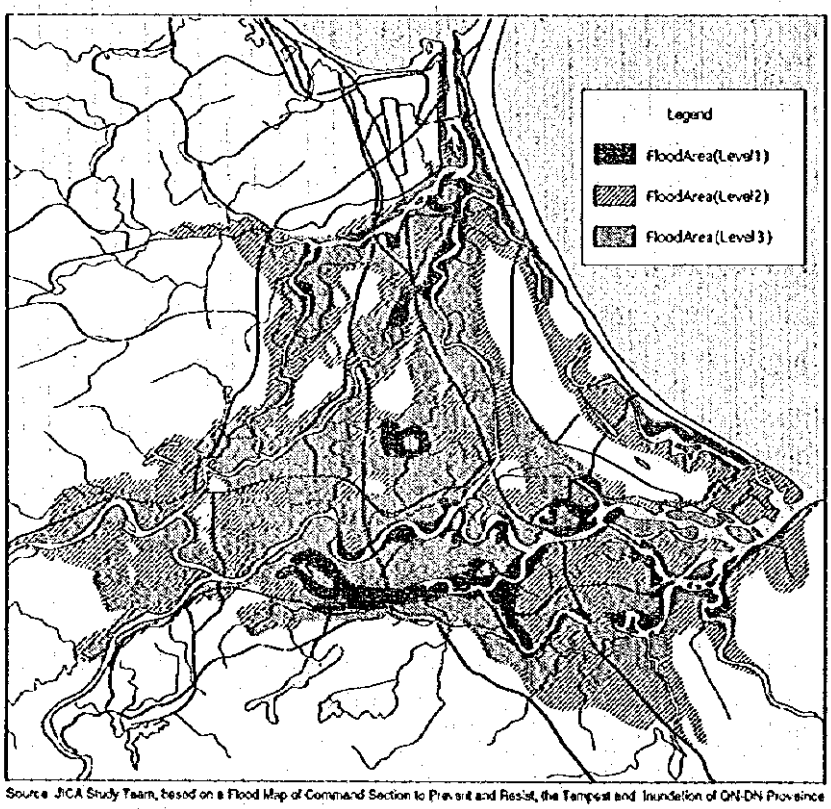
  Other areas:
  - Development of piped water supply facilities in Hoa Vang and Duy Xuyen, and
  - Development of water supply facilities, sewerage and solid waster disposal facilities in the new residential areas near Hoa Khanh and Dien Ngoc - Dien Nam.

Figure 12.14 Da Nang Development Plan



Source: JICA Study Team

Figure 12.15 Flood Areas in Da Nang Area



Source: JICA Study Team, based on a Flood Map of Command Section to Prevent and Resist, the Tempest and Inundation of QN-DN Province

6) Hoi An Area

(1) Development direction

As Hoi An is a historical tourism town which is nominated as a UNESCO World Heritage site, tourism is the leading sector of the town. Therefore, it is proposed that Hoi An town be developed under a tourism promotion zone scheme. Key development components of Hoi An are mainly twofold: flood control and tourism facilities development.

(2) Development plan

The proposed urban development of Hoi An is as follows:

- Development Zoning: It is proposed that Hoi An be zoned as shown in Figure 4.4.8. Broadly, the town is zoned into urban, surrounding rural, and coastal areas.
  - Urban development control area: This area shall be developed for human settlement and be protected from flood. It is proposed to construct an embankment road surrounding the urban area.
  - Coastal resort development area: Hotel development is proposed in this area.
  - Local landscape safeguarding area: Unique "historic and rural atmosphere" shall be maintained in this area.
  - Buffer (green) area: This zone is to limit urbanization against the urbanization pressure arising from the Dien Ngoc - Dien Nam industrial estate.

Table 12.15 Proposed Zoning System and Items to Control in Hoi An

Proposed zones	Items to control						
	Bldg Height	Bldg Use	Land reclaim	Deve-lopm't facility	Advert-izement signs	Sanita-tion	Land use
Sanctuary zone	-	-	-	-	❑	★	★
Development control zone	❑	-	❑	❑	❑	★	★
Landscape control zone	❑	❑	❑	❑	❑	★	★
Urban development area	❑	❑	❑	❑	❑	★	★
Coastal resort area	❑	❑	❑	○	❑	★	★
Local landscape safeguarding	❑	○	❑	○	❑	▲	★
Buffer area	❑	❑	-	-	❑	▲	★
Riverside control area	-	❑	-	-		★	★
Roadside control area	❑	○	❑	❑	❑	▲	★

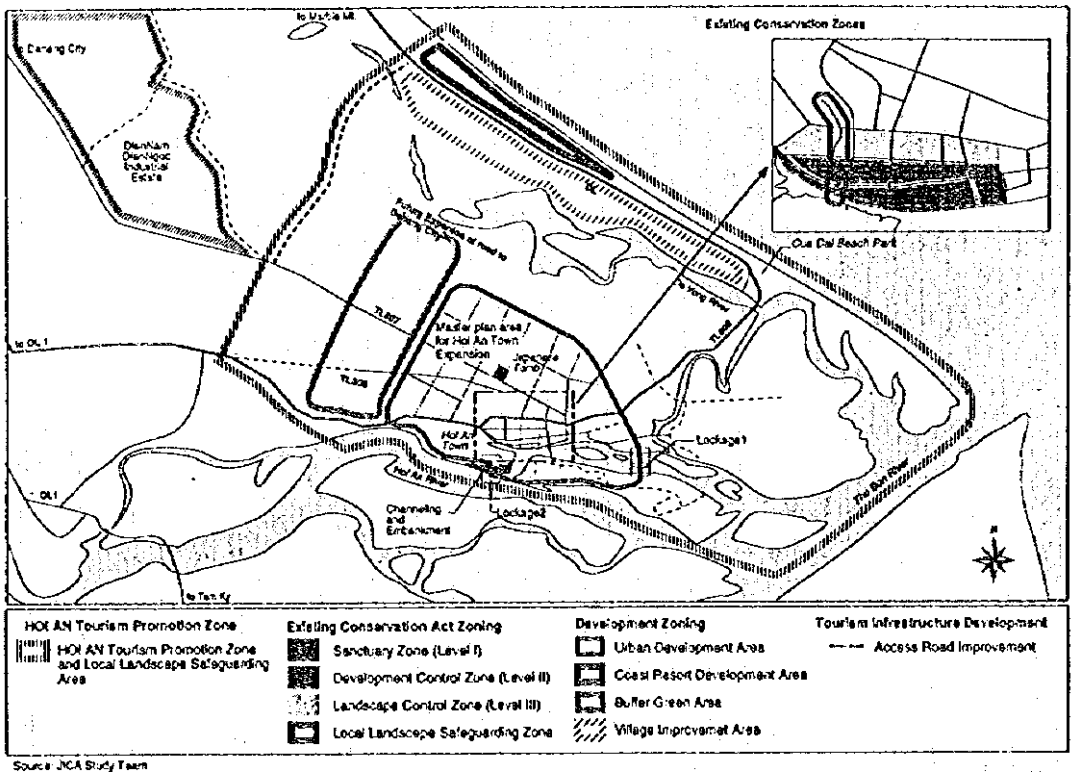
Note: ★: necessary; ○: allowable; ❑: conditionally allowable; ▲: not applicable ✕: not allowable
Source: JICA Study Team

- Flood control embankment road: An embankment road is proposed for the following purposes:
  - To protect "Hoi An Historical Town" from Thu Ban River flood,
  - To enclose the urban area including future expansion, and
  - To use the embankment road as ring road of the urban area.

  Careful attention must be paid to road design for the embankment road not to ruin the landscape.
- Traffic control: To protect the historic heritage and mitigate air pollution in the old quarters, traffic control is also needed.

- Utilites development: Improvement of water supply facilities and a sewerage system in the urbanized area are needed.

Figure 12.16 Hoi An Development Plan



Source: JICA Study Team

7) Dung Quat - Quang Ngai Area

(1) Development direction

Quang Ngai aims at a development led by industrial development to boost the province's economy. To that end, it is proposed to set up the four industrial estates, namely, Dung Quat port, Tinh Phong, Quang Ngai Town, and Pho Phong Industrial Estates. Human settlements in Quang Ngai shall be influenced much by the performance of the industrial estates, with Dung Quat - Quan Ngai as main development area in the province. Quang Ngai shall be the commercial and services center for the province economy.

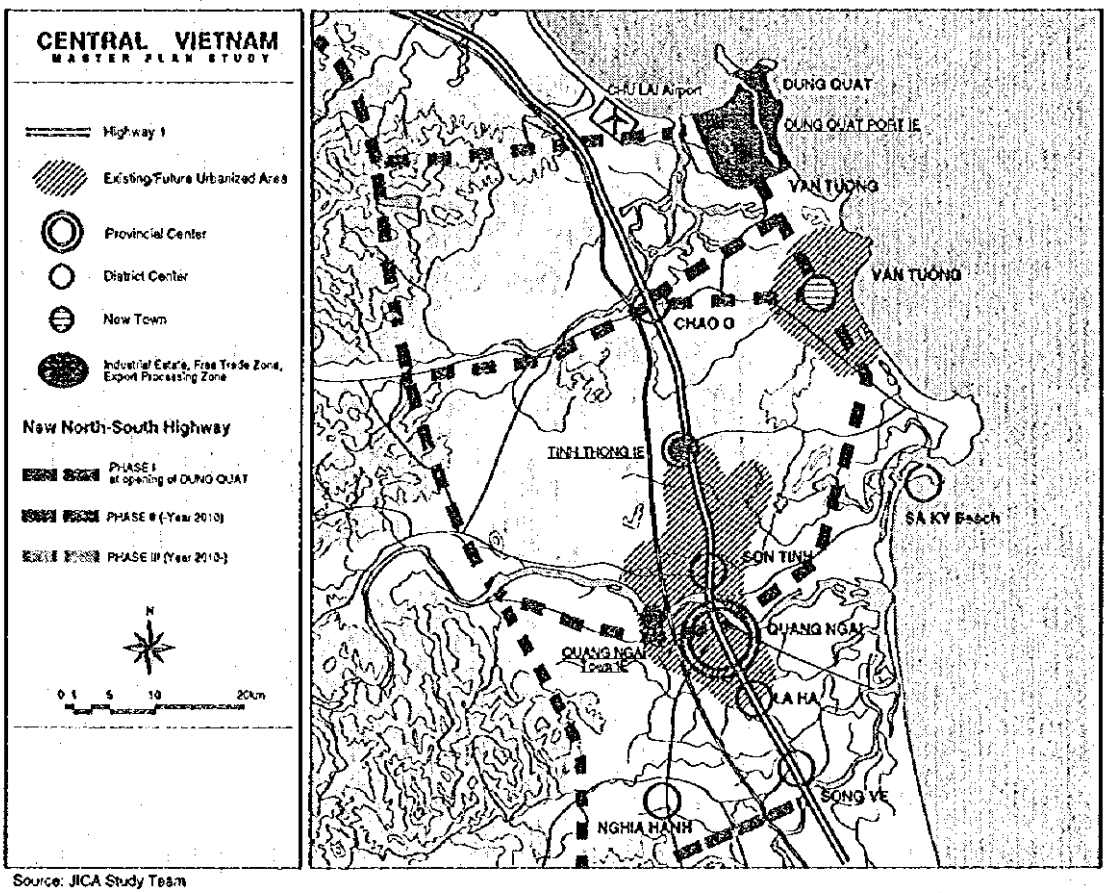
(2) Development plan

The major development components of Quang Ngai are as follows:

- Dung Quat development: This is the key development to form a heavy industrial complex. This development contains:
  - Dung Quat port
  - Industrial estates: The industrial estates will have: power, ferrous metallurgy, chemical, and machine equipment industries
  - New town: A new town is proposed to be constructed at Van Tuong Area. Some 50,000 people are estimated to live there in 2010 although a further study is needed.

- Industrial Development: Three industrial developments other than Dung Quat industrial development are proposed to be established for the following types of industries:
  - Tinh Phong IE: Construction material,
  - Quang Ngai IE: Foodstuff, Leather and artificial leather,and
  - Pho Phong IE: Food stuff, and Wood processing and forestry.
- Utilities development: The following utility development is proposed:
  - Expansion of piped-water supply sytem in Quang Ngai,
  - Development of piped-water supply facilities in Son Tin and Tu Nghia,
  - Expansion of storm water drainage in Quang Ngai,
  - reinforncement of solid waste disposal facilities in Quang Ngai, and
  - Development of water supply facilities, sewerage and solid waster disposal facilities in the Van Tuong new town area.

Figure 12.17 Dung Quat - Quang Ngai Development Plan



Source: JICA Study Team

12.6.4 Telecommunications

The proposed socio-economic development in the study area would create rapidly increasing traffic demand for telecommunications, and therefore, a system improvement programme to meet the requirement for at least 15 sets per 100 people by the year 2000 will become necessary. Also, associated with the new development projects that may come in the study

area, such as the Dung Quat industrial development, Chan Mayport and city development, and the development of a new East-West Trade Corridor along Highway No. 9, due consideration should be given to the telecommunications sector that can effectively support such developments.

One factor contributing to the rapid growth of Viet Nam's telecommunications sector is thejoint venture cooperation of Vietnamese enterprises with foreign telecom companies through business cooperation contracts (BCC). Under the BCC arrangement, the country'snorth-south telecommunications spine with a high speed Synchronous Digital Hierarchy Ring Network (SDH) is under construction, and its first section that runs parallel to Highway No. 1 and targets populations areas, was completed in March 1996. Eventually a 3,000 km, high-speed, high-capacity fibre optic telecommunications network that runs the full length of the country will be constructed.

12.7 PROPOSED PROJECTS AND PROGRAMS

The following urban-development-related projects/programs are tentatively listed up for the further analyses. Specific urban infrastructure or utility project, such water supply, sewerage, power, etc., are covered by the other relevant sectors.

URB-01: Commercial and business area (re)development in Da Nang

Da Nang is expected to be the primary urban center of not only the study area but central region. As such, Da Nang considerably needs to bestrengthen its commercial and business functions and thus the develop favorable business district to support industrial and service activities.

URB-02: Urban Environment Improvement Projct of the Hue Royal Citadel

The Old Quarters in the Hue Royal Citadel is a good tourism resource listed by UNICEF as a world heritage. However, it is dilapidated with many-time disasters and war and not maintained well. Along with the rehabilitation work for the place, rehabilitation of the whole quarters is important to restore the atmosphere of the Royal Citadel. To that end, townscape and street-scape should be improved by rehabilitating houses, other properties in the old quarters. This project will go with flood control project, and some other disaster prevention and infrastructure and utilities development projects.

URB-03: Townscape rehabilitation and conservation project in Hoi An

Hoi An is an old port town and has historical value. However, maintenance of facade of old houses and other buildings has not been done well. For both maintenance of historical value and improvement of tourism attraction, rehabilitation of the townscape of Hoi An is an important project. This project will be a part of the tourism promotion zone concept.

URB-04: Urban poor resettlement projects in Hue

In Hue, urban poor, namely, those living on the Huong and other rivers, those livingon the wall of the Royal Citadel, and those living in the city's shanty slum areas. Housing improvement of them is important project for the city to improve both the residents' quality of life and amenity and appearance of the city.

URB-05: Waterfront park development in Hue and Da Nang

Da Nang and Hue are to be the central urban cores of the Area and expected to have many people to live, work, and visit. For better urban amenity, it is good to make best use of river waterfront areas.

URB-06: Urban traffic management program in Da Nang and Hue

Da Nang and Hue still do not have so much traffic as in Ha Noi or HCMC, yetit will not long. It is more likely than not that the two cities will be suffering from urban traffic problems such as air pollution, noise, traffic accidents, traffic jams, etc. which are already a headache of Ha

Noi and HCMC. Before they reach that situation, comprehensive urban traffic management system must be set up including mass transit.

URB-07: City and town beautification program

Cities and towns in the study area are rather dusty and streets look unclean. This scene is found not only in the cities and towns on the study area but maybe everywhere in the nation. This is bad not only for urban sanitation but also gives a ;bad image of an area. In particular,to tourism or some other development to attract visitors in the Area, this is really discouraging. On the International Women's Day (March 8, 1996), according to the Vietnamese News, Ha Noi Women's Association stated the movement, stating: "Women and people of the capital of the sake of a clean environment, don't throw garbage in the streets". As a result, encouraging people practiced it and kept the front of houses clean and tidied streets up on. The same practice and some other city beautification program to keep town and city clean will be necessary to improve the quality of life and amenity.

URB-08: Chan May Free Trade Zone Development

The central region requires a large commercial port to accommodate and serve the trade with Greater Mekong Sub-Region Area, such as Thailand and Lao, especially on National Highway No. 9 through Lao Bao, Quang Tri. Da Nang port or the proposed Lien Chieu port will not be sufficient for that purpose from a technical and regional development viewpoints. Chan May is at a good location for a deep sea port with an adequate hinterland for the related development.

Chan May is located in the middle of Hue and Da Nang and will form a centerof Hue-Da Nang Urban Corridor. This development idea is supported by Hue-Da Nang Inter-City Highway with Hai Van Tunnel.

The project includes a new town construction, together with free trade zone consisting of a bonded area and commercial area with trade and processing functions, at the hinterlandof Chan May Commercial Port. Free trade zone (FTZ) accommodates mainly trade processing industries of both foreign and local origins with attractive investment incentives. The FTZ also has a business zone to accommodate supporting service industries such as banks, insurance firms, forwarders, hotels and so forth. In the FTZ, semi-finished and intermediate goods, under a "bonded" condition with the simplified one-stop import/export formalities, are to be stored, assembled, processed, packed, labeled, and distributed.

URB-09: Van Tuong New Town Development

Van Tuong is located on coastal area just south of Dung Quat and west of Chau O, andnorth of Quang Ngai. In line with Dung Quat Industrial Development, this new town is planned to be constructed to form a new urban area for residences and business activities, which is roughly estimated to have 50,000 of population in 2010. The new town together with Quang Ngai, Chau O, and Dung Quat will shape an heavy industrial urban center.

The development will be further studied with full scale development plan of Dung Quat with time frame.

CHAPTER 13 RAILWAY

This appendix chapter presents and overview of existing rail infrastructure and facilities within the study area, general relationships to national systems, as well as opportunities and constraints appropriate to potential improvement programs.

13.1 OVERVIEW OF EXISTING CONDITIONS

The aggregate length of the Viet Nam National Railways (VNR) meter gauge network is 2,265.3 kilometers, while the standard gauge system totals 161.1 kilometers. Inclusion of a further 222.0 kilometers of mixed gauge extends the VNR commercial distance to 2,648.9 kilometers. Major routes in the system are:

Hanoi	- Ho Chi Minh City	:	1,726.2 km
Hanoi	- Haiphong	:	101.5 km
Hanoi	- Lao Cai	:	296.0 km
Hanoi	- Lan Son - Dong Dang	:	163.0 km
Kep	- Ha Long	:	106.0 km
Dong Anh	- Quan Trieu	:	53.0 km

In addition, trunk routes exist between Luu Xa and Kep as well as Hanoi and Dong Anh (Figure 13.1).

The Hanoi-HCMC railway is the principal north-south line uniting all parts of the country, including the four provinces of the study area. Major cities and industrial zones served by the line include Hanoi, Nam Dinh, Thanh Hoa, Vinh, Hue, Danang, Quy Nhon, Bien Hoa and Ho Chi Minh city.

The Hanoi-HCMC line is meter-gauge track, with original construction completed between 1899 and 1936. There are five bottleneck sections, including Hai Van pass, with poor alignment characterized by steep slopes and sharp curves. There are 686 bridges with a total length of 24,563 meters and most of these are designated slow speed sections due to noticeable deterioration caused by war damage and aging. There are 27 tunnels with a total length of 8,405 meters in the rolling and mountainous areas of Central Viet Nam. Leakage through cracks is observed in many places and there is a risk of falling concrete liner. The train speed is limited in numerous places.

In terms of the tracks, many old, light weight rails (27-30 kg/m) are used, particularly south of Qui Nhon, causing concern regarding safe train operation. A slow speed limit has also been introduced in many places where the turnouts are deteriorated or, in the majority of cases, poor track conditions associated with hazardous bridges. Every year, part of the track is submerged under water for a few days or even several weeks due to torrential rain. The length of sections which are particularly vulnerable to flooding is approximately 160 kilometers. Sites are dotted along the entire route where there is a danger of falling rocks or landslides.

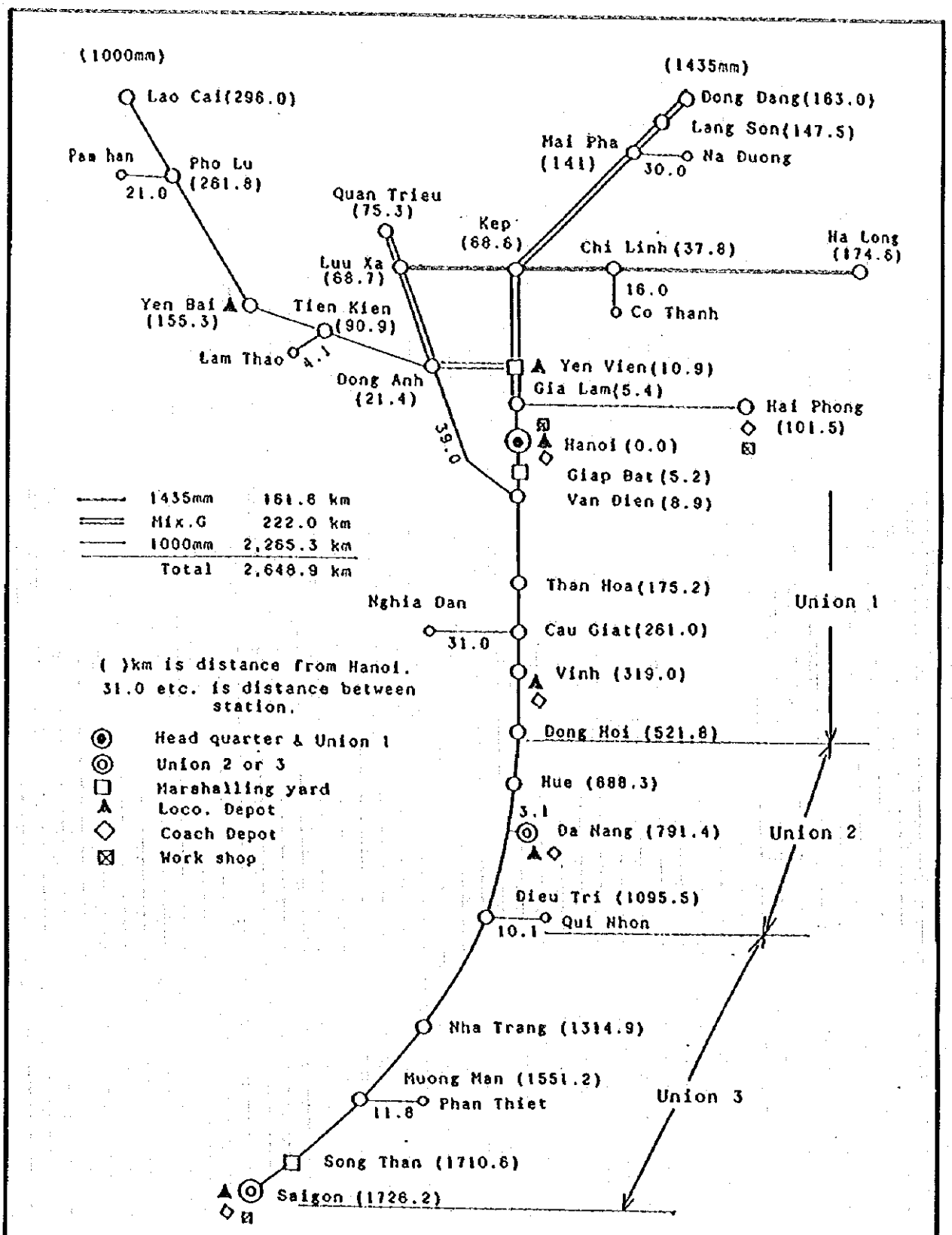


Figure 13.1 NATIONAL RAIL NETWORK

The substandard and deteriorated conditions of the line has resulted in several capacity "bottlenecks", with one of the most severe being Hai Van pass (22 trains per day, total both directions). These limitations have constrained the ability of VNR to operate trains; daily volume varies from 14-28 trains, almost equally split between passenger and cargo services (Table 13.1).

Table 13.1 1994 Train Volume and Capacity

Hanoi-Ho Chi Minh City Line

Section	Number of Trains			Track Capacity	V/C Ratio
	Passenger	Freight	Total		
Hanoi-Bim Son	12-14	10-14	22-28	40	0.70
Bim Son-Vinh	10-12	8-6	18	32	0.56
Vinh-Dong Hoi	6	8	14	20	0.70
Dong Hoi-Hue	12	8	20	36	0.56
Hue-Danang	14	8	22	22	1.00
Danang-Nha Trang	10-12	8	18-20	30	0.67
Nha Trang-HCMC	10	8	18	24	0.75

Note: Volume and capacity expressed as daily, two-way trains.

The most congested service point is found within the study area (Hue-Danang section via Hai Van pass) where daily capacity (22 trains) is fully utilized (volume-capacity ratio = 1.00). No additional trains can therefore be operated until line capacity is upgraded.

VNR has consistently improved, within limits posed by mostly outdated rolling stock, service times along the Hanoi-HCMC line. In 1994, limited express trains averaged 48 km/h between terminus points, achieving maximum speeds of up to 80 km/h. The fastest passenger service between Hanoi and HCMC therefore totaled 36 hours with six intermediate stops. Service times for trains with more frequent stops ranged from 41-46 hours.

Freight train schedules between Hanoi (Giap Bat) and HCMC varied, in 1994, over a much wider spectrum. Three daily through services mastered the distance in some 55 hours. However, other scheduled services require from 87-98 hours, while demand-specific trains require some 74 hours. Average freight train speed therefore ranges, depending on service selected, from 18-32 km/h.

The Hanoi-HCMC line is clearly dominant in terms of VNR usage patterns. During 1993, the line accommodated some 62 percent of transported national ton-kilometers and 81 percent of national passenger-kilometers (Table 13.2).

The study area accounted for some 889,000 passengers during 1993, on roughly one-fourth of total Hanoi-HCMC line activity. Quang Nam-Danang province generated some 408,000 passengers placing it in fourth position nationally after Hanoi (527,000 passenger), Quang Binh (476,000 passengers) and HCMC (470,000 passengers). Thua Thien-Hue followed closely with some 331,000 passengers, thus underscoring the importance of Hue and Danang stations in terms of VNR passenger transport activity. Indeed, highest volumes (some 1.4 million passengers a year) were found on the Hue-Danang and Ma Lam-HCMC sections of the Hanoi-HCMC line.

Table 13.2 Relative Role of Hanoi-HCMC Line

Viet Nam National Railways

Year	Total Nation		Hanoi - HCMC Line			
Cargo Shipment						
	Tons	Ton-km	Tons	Percent	Ton-Km	Percent
1990	2,341	847,023	992	42.4	489,337	57.8
1991	2,567	1,103,309	1,215	47.3	707,293	64.1
1992	2,774	1,076,879	1,298	46.8	689,796	64.1
1993	3,187	978,132	1,581	49.6	601,797	61.5
Passenger Travel						
	Persons	Person-Km	Persons	Percent	Person-Km	Percent
1990	10,443	1,912,957	5,057	48.4	1,544,440	80.7
1991	9,158	1,767,060	4,567	49.9	1,424,316	80.6
1992	8,719	1,751,669	4,358	50.0	1,436,202	82.0
1993	7,793	1,720,984	3,675	47.2	1,400,530	81.4

Note: All volumes in units of 1,000 per year.

The average distance per passenger trip on the 1,726 kilometer Hanoi-HCMC line was, in 1994, some 380 kilometers. Thus, while north-south journeys between line termini retain significance, the importance of shorter-distance inter-province demand (such as Hue-Danang) cannot be overlooked.

The study area's contribution to Hanoi-HCMC line cargo shipments is more modest. During 1997, an average of 274,000 tons were loaded or unloaded, roughly 17 percent of line total. Highest activity was recorded in Quang Nam-Danang province: some 57,000 tons loaded, and 130,000 tons unloaded. This can partly be explained by reviewing the type of cargo that is typically attracted to the Hanoi-HCMC line: more than 50 percent of inter-province 1994 cargo consisted of building materials, principally cement, stone, soil and gravel. In comparison, over 80 percent of Cai Lan cargo consisted of coal and 50 percent of Lao Cai line cargo consisted of apatite (Table 13.3)

13.2 MODAL EVOLUTION

When the 1989 reforms allowed shippers to choose modes, changes in the modal distribution gathered pace. In terms of tons loaded, rail lost heavily, water transport largely maintained status quo, and road transport gained substantially. Similar patterns are exhibited by passenger transport; that is, utilization of rail services continues to decline, while road-based activity continues to increase. During the latest available year of record (1994), near two-thirds of national cargo tons, and in excess of 80 percent of passengers, were apparently transported via the road mode. For both cargo and person transport, road demand may actually be understated as it is unlikely that the proliferation of "own-account operators", which provide both buses and trucks, is fully reflected in national statistics for the most recent years.

Table 13.3 OVERVIEW OF 1994 RAIL CARGO TRANSPORT

COMMODITY TRANSPORTED (1)	RAIL LINE							
	HANOI-HCMC		LAO CAI		CAI LAN		VIET NAM (2)	
	TONS	Percent	TONS	Percent	TONS	Percent	TONS	Percent
Coal	305,468	13.9	37,856	3.7	493,948	82.1	756,974	20.7
Gasoline, Kerosene	22,853	1.0	24,243	2.4	121	0.0	72,306	2.0
Minerals	9,177	0.4	21,284	2.1	52,115	8.7	82,551	2.3
Machinery, Equipment	26,281	1.2	4,578	0.4	769	0.1	78,711	2.2
Apatite	30,558	1.4	504,446	48.9	1,044	0.2	504,902	13.8
Fertilizer	233,997	10.6	176,319	17.1	2,946	0.5	270,448	7.4
Chemical	27,112	1.2	34,617	3.4	476	0.1	64,482	1.8
Cement	607,020	27.5	99,466	9.6	24,725	4.1	775,355	21.2
Stone, Sand Soil, Gravel	532,690	24.2	54,292	5.3	14,987	2.5	594,431	16.3
Lime, Brick, Tile	17,760	0.8	149	0.0	113	0.0	25,281	0.7
Wood, Wood furniture	126,027	5.7	5,364	0.5	6,024	1.0	134,388	3.7
Forest product	11,552	0.5	3,987	0.4	769	0.1	11,778	0.3
Other agricultural product	3,399	0.2	2,575	0.2	441	0.1	6,262	0.2
Rice, Corn	41,245	1.9	3,439	0.3	642	0.1	43,661	1.2
Salt	5,178	0.2	19,470	1.9	0	0.0	20,806	0.6
Foodstuff	80,043	3.6	353	0.0	0	0.0	80,304	2.2
Cotton, Silk fabric	1,587	0.1	0	0.0	0	0.0	1,587	0.0
Cotton yarn	12,943	0.6	171	0.0	0	0.0	13,270	0.4
Other commodity	44,500	2.0	11,513	1.1	0	0.0	45,479	1.2
Animals	65,078	3.0	27,434	2.7	2,443	0.4	74,326	2.0
TOTAL	2,204,468	100.0	1,031,556	100.0	601,563	100.0	3,657,302	100.0

Source: Vietnam National Railways and compiled in "The Feasibility Studies on the Rehabilitation and Improvement of the Railways in Viet Nam", by Japan International Cooperation Agency, for Ministry of Transport and Communication, Government of Viet Nam, December 1995 (Draft Final Report)

(1) Inter-provincial cargo shipments.

(2) Some shipments double-counted on a line basis.

Modal preferences within the study area are even more pronounced. The recently-completed national rail improvement feasibility study[1] suggests that the road mode accounts for more than 80 percent of year 1994 inter-provincial cargo and passenger flows which originated in or were destined for Quang Tri, Thua Thien-Hue, Quang Nam-Danang and Quang Ngai provinces (Table 13.4).

Table 13.4 Overview of 1994 Study Area Inter-Provincial Transport Demand

Regional Origin or Destination	Cargo Tons (Percent)			Passengers (Percent)			
	Road	Rail	Total	Road	Rail	Air	Total
Northern Mountains	81.7	18.3	100.0	96.8	3.2	0.0	100.0
Red River Delta	91.6	8.4	100.0	85.6	8.8	5.6	100.0
North Coastal (*)	69.5	30.5	100.0	73.2	26.8	0.0	100.0
South Coastal (*)	96.2	3.8	100.0	91.2	8.8	0.0	100.0
Western Highlands	100.0	0.0	100.0	97.5	2.5	0.0	100.0
Eastern Nam Bo	88.0	12.0	100.0	75.0	15.9	9.1	100.0
Mekong River Delta	100.0	0.0	100.0	100.0	0.0	0.0	100.0
Total	85.1	14.9	100.0	82.7	14.0	3.3	100.0

(*) Excluding study area provinces.

The modal drift to the road is not surprising, and has been a recurring feature of the transport fabric of Asian nations. Only the road mode appears to consistently provide the speed and

[1] "The Feasibility Studies on the Rehabilitation and Improvement of the Railways in Viet Nam", by Japan International Cooperation Agency, for Ministry of Transport and Communications, Government of Viet Nam, December, 1995 (Draft Final Report).

reliability of (virtually) door-to-door service favored by users, frequently buttressed by the providers ability to offer such service at an attractive price.

In Viet Nam the modal evaluation of the road sector might have been even more accelerated if roads had been better and vehicles more suitable and/or plentiful. Once the vehicle fleet is renewed and enlarged, and the infrastructure improved, road freight and passenger operation should expand rapidly. Experience confirms that, at the "take-off" stages in developing economies, national wealth (GDP or GDP per capita) is closely linked with modal preferences. Three recent studies in Viet Nam have examined this issue in detail:

- The UN-sponsored "National Transportation Sector Review" (NTSR)[1] evaluated alternative year 2000 economic growth scenarios, and provided forecasts by major passenger modes and 15 commodity groupings.
- The IBRD-sponsored "Transport Sector Review"[2] estimated year 2000 modal shifts based on recent experiences of other Asian nations at a similar stage of national development.
- The JICA-sponsored national rail improvement feasibility study[3] estimated (up to) year 2010 modal shares based on a detailed mode-split model sensitive to travel times, trip distances and journey costs. Forecasts reflect inter-province trips only, and assume an improved railway network.

Conclusions formulated by these studies permits the estimation of modal elasticity's, that is, for a given change in GDP, what likely change in modal share can be expected. In summary, results are (Table 13.5):

Table 13.5 Relative Elasticity's by Transport Mode to Year 2000

Source	Passenger Transport				Cargo Transport		
	Road	Rail	Inland Waterway	Air	Rail	Road	Inland Waterway
NTSR-1992	1.44-1.55	0.27-0.38	*	*	0.77-0.82	1.15-1.16	0.89-0.94
IBRD-1993	1.40-1.43	0.40-0.43	0.29-0.50	2.50-2.86	0.29-0.30	1.29-1.40	0.57-0.60
JICA-1996	1.18-1.40	0.55-0.62	*	1.15-1.33	0.45-0.49	0.80-0.88	0.68

While each study was conducted to unique requirements, and possibly focused on different goals, the underlying conclusions are consistent:

- Sizable increases in air passenger travel can, at least for the near-term future, be expected with relative growth in passengers likely to exceed expected growth in GDP. However, compared to other modes, the volume of trips will remain modest.
- The growth rate of road passengers is likely to exceed that of GDP by some 40-50 percent. With exception of the rail-oriented JICA study road cargo growth is shown as

[1] "National Transportation Sector Review", by BCEOM Consultants, Paris, for Ministry of Transport and Communications, Government of Viet Nam, 1992.

[2] "Viet Nam Transport Sector Review", The World Bank, 1993.

[3] "The Feasibility Study on the Rehabilitation and Improvement of the Railways in Viet Nam", op.cit.

exceeding GDP growth, but at a lesser rate than road passenger growth. The already prominent role of the road mode will therefore likely expand.

- Rail and inland waterway modes will, relative to existing demand, likely experience absolute increases. This relative rate of growth is, however, expected to lag increases in GDP.

These data suggest that, within the framework of an expanding and market-driven economy, an expenditure program must be defined which balances modal upgrading with user preferences. Thus, within the study area, a near to medium term focus upon improvement, expansion and maintenance of road infrastructure, balanced with the spatial economic aspirations of Quang Tri, Thua Thien-Hue, Quang Nam-Danang and Quang Tri provinces, is appropriate. However, as important as road-based investments are, concurrent and strategic enhancement of rail services continue to be desirable, albeit possibly in a more focused and/or project-specific manner vis-à-vis to the road mode.

13.3 OPPORTUNITIES AND CONSTRAINTS

The Hanoi-Ho Chi Minh Railway stretches 1,726 kilometers linking Hanoi, the capital of Viet Nam which is located at the center of the Red River delta with some 3.15 million inhabitants, and Ho Chi Minh city, Viet Nam's largest commercial city located at the center of the Mekong River delta with some 4 million inhabitants. Given geographic and topographic characteristics, this trunk railway line forms the nations backbone linking north and south. Along its route lie such major cities and industrial zones as Nam Dinh, Thanh Hoa, Vinh, Hue, Danang, Quy Nhon, Nha Trang and Bien Hoa. Despite its crucial importance, the realities of the Hanoi - Ho Chi Minh railway today are epitomized by highly deteriorated infrastructure due to war damage, natural aging and lack of investment. There exist numerous compulsory "slow speed" sections due to safety hazards, and neither the equipment for safe train operation nor the rolling stock are exceptions to the general deterioration. Many of the disaster-hit areas have not been rehabilitated, causing train operation stoppages during bad weather. Safety and reliability levels appear to be lower than desirable levels. As a result of these adverse conditions, the average train speed is slow and the passenger service level, including passenger comfort during travel, is unsatisfactory. Appropriate investment is urgently required to improve the safety, reliability, service and management efficiency so that the restored proper functions of the railway service can positively contribute to socioeconomic development in areas along the route.

A review of passenger and cargo transport patterns of the corridor confirms that while Hanoi-HCMC flows are modest, intermediate inter-province flows are consistent and pronounced. This finding suggests that improvement of inter-city rail passenger service is strongly required. In the case of freight transportation, and recognizing coastal shipping may eventually become a dominant force in long-distance, the railway will still maintain an important share of inter-regional transportation and the movement of such specific commodities as cement, coal, iron ore and chemical fertilizers, among others.

The improvement of rail services within the study area can only be achieved as an integral element of upgrading the Hanoi-HCMC line. The initial step in this process would likely include[1]

- Rail structure rehabilitation: bridge inspections, rehabilitation and replacement; tunnel inspection and rehabilitation; drainage measures and installation of treatments to combat flooding and/or submerging of tracks;
- Track rehabilitation and station improvements;
- Signaling and communication rehabilitation;
- Rolling stock rehabilitation, upgrading of workshops and new rolling stock acquisition;
- Formulation of specific measures to integrate rail operation with urban transport in Hanoi and HCMC.

The Hue-Danang section of the Hanoi-HCMC line should be adopted as a demonstration project which, in addition to previously-mentioned line-wide upgrading, can serve as a model for subsequent specific improvements of other priority sections in the Vietnamese rail system. To achieve this goal, several site-specific projects will likely be needed:

- Hue and Danang stations will need to upgrade ticket counters, waiting areas, toilets, parking areas, public spaces and other passenger amenities. A computerized ticket reservation and issue system will be essential, as will proper displays of up-to-date train operations and schedules. Multi-lingual services should be available for the convenience of all passengers.
- In addition to limited express trains between Hanoi and HCMC, inter-city services should be provided not only between Hue and Danang, but possibly also Vinh, Dong Hoi and Hue/Danang. Rolling stock for this service should be modern and well-maintained.
- Cargo handling at Hue and Danang stations can significantly be improved via the acquisition of proper fork lifts and other stocking/storing machinery, as well as the provision of cargo sheds which instill the potential user with a degree of comfort that cargo shipments will be handled speedily and safely.

The physical improvements suggested for the Hanoi-HCMC line are expected to address the existing capacity constraint posed by the Hai Van tunnels. Thus, section capacity could be increased with enhanced trackage, signaling and construction of additional sidings. However, rail demand in the longer term may still be constrained even if the existing Hai Van tunnel section is improved to practical and possible limits.

- It is therefore urged that, at the earliest opportunity, a feasibility study be initiated to examine realistic options for improving line capacity for the Hai Van section between Lang Co and Kim Lin.

This study should examine a comprehensive range of options, including the possibility of constructing new tunnels along an alternative alignment.

[1] Based on recommendations contained in "The Feasibility Studies on the Rehabilitation and Improvement of the Railway in Viet Nam", op.cit.

CHAPTER 14 SEA TRANSPORT

14.1 PRESENT CONDITION

14.1.1 Existing Condition of Ports in Viet Nam

1) Port Classification

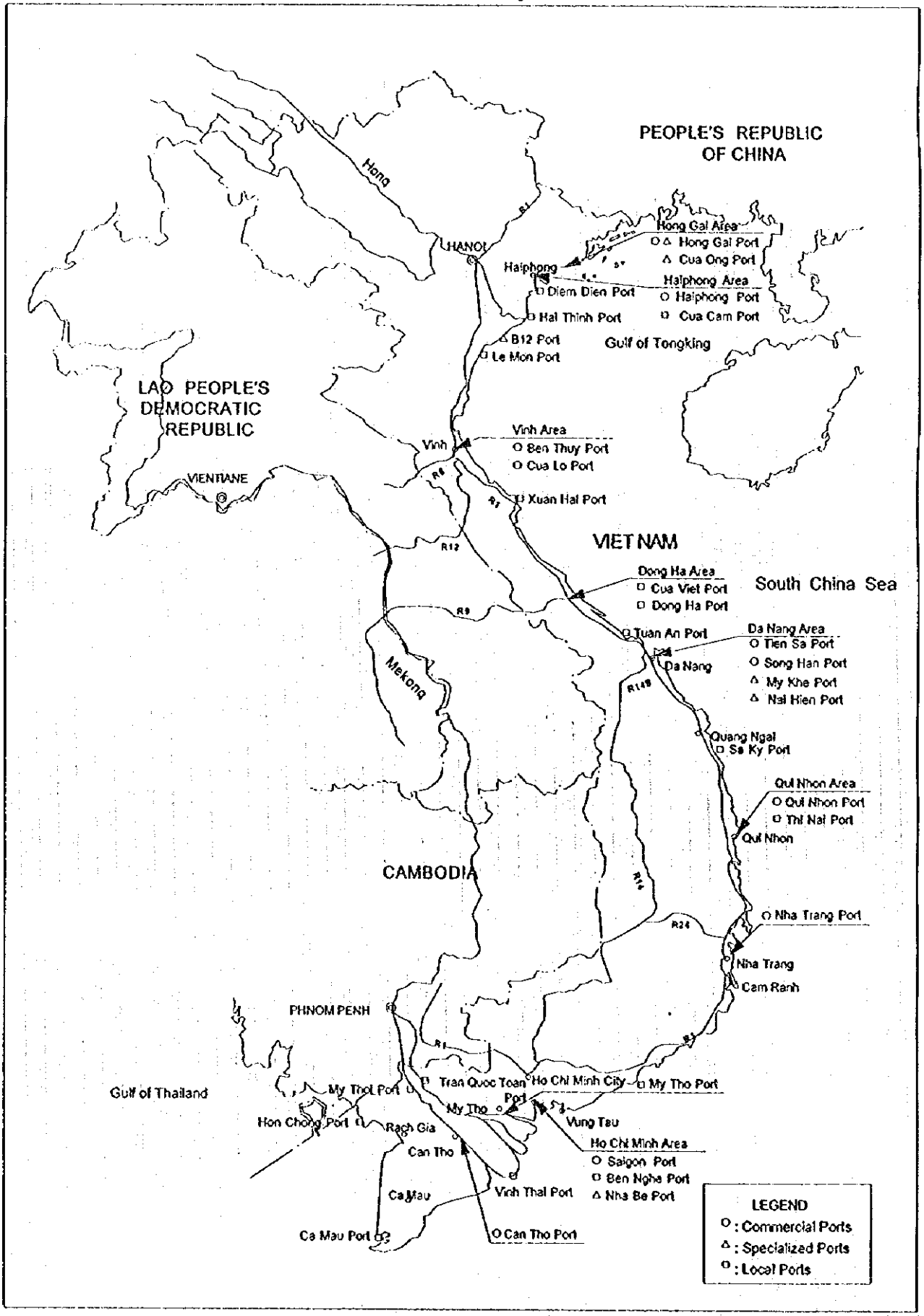
Existing ports in Viet Nam are classified into three categories: i) commercial ports; ii) specialized ports; and iii) local ports. Table 14.1.1 lists the 31 major ports in Viet Nam, and their locations are shown in Figure 14.1.1.

Table 14.1.1 Classification of Seaports in Viet Nam

Category		Name of Port
1. Commercial ports	North Region	Hai Phong, Quang Ninh (Hong Gai)
	Central Region	Nghe Tinh (Ben Thuy or Cua Lo), Da Nang (Tien Sa, Song Han), Qui Nhon, Nha Trang
	South Region	Saigon, Can Tho
2. Specialized ports for coal and oil	Coal Port	Cua Ong, Hong Gai
	Oil Port	B12, My Khe, Nha Be, Nai Hien
3. Local Ports		Cua Cam, Diem Dien, Hai Thinh, Le Mon, Xuan Hai, Dong Ha, Cua Viet, Thuan An, Sa Ky, Thi Nai, Ben Nghe, Tran Quoc Toan, Vinh Thai, My Thoi, Hon Chong, My Tho, Ca Mau

Source: MASTER PLAN STUDY ON VIET NAM SEAPORT SYSTEM BY MOTC

Figure 14.1.1 Location of Existing Ports in Viet Nam



2) Commercial Ports

(1) Overview Of VINAMARINE Ports

Commercial ports are directly managed by the Ministry of Transport and Communications (VINAMARINE). Main characteristics and amount of throughput of VINAMARINE ports are shown in Tables 14.1.2 and 14.1.3.

Table 14.1.2 Main Characteristics of VINAMARINE Ports

Name of Port	Depth at berth (m)	Length of berth (m)
Saigon	19	1,965
Hai Phong	3 - 8.7	2,366
Da Nang	3 - 10	1,570
Quang Ninh	4 - 5	160
Qui Nhon	8	348
Nha Trang	6	177
Nghe Tinh	4 - 5	160
Can Tho	8	142

Source: Ministry of Tranportation

Table 14.1.3 Throughput of VINAMARINE Ports

Unit: 1,000 ton

Ranking No.	Name of Port	1990	1991	1992	1993	1994	1995	Percent of 1995 Total (%)
1	Saigon	4,350	4,160	5,000	5,510	6,440	7,210	50
2	Hai Phong	2,520	2,430	2,380	2,710	3,250	4,520	31
3	Da Nang	430	260	310	370	670	830	6
4	Quang Ninh	300	420	720	680	520	690	5
5	Qui Nhon	300	300	340	410	400	450	3
6	Nha Trang	220	150	150	180	210	340	2
7	Nghe Tinh	80	130	130	180	310	310	2
8	Can Tho	90	110	60	-	70	130	1
	Total	8,190	7,850	9,040	10,040	11,870	14,480	100

Source: Ministry of Transportation

These data yield several observations:

- The two largest ports, Saigon and Hai Phong, accommodate 50% and 31% of total throughput, respectively.
- Total activity at these two ports accounts for about 80% of VINAMARINE port throughput, and roughly half of total throughput of all Vietnamese ports.
- Throughput of the eight ports achieved an average annual growth of 12.4% between 1990 and 1995.

- The throughput of Saigon port increased by 10.8% per annum between 1990 and 1995.
- Hai Phong port recorded the highest growth in throughput over the past 6 years: an average of 13.2% per annum.

(2) Main Characteristics Of VINAMARINE Ports

Saigon port is located in the center of Ho Chi Minh (HCM) City, 89 km away from the river mouth. Saigon port consists of three areas, Nha Rong, Khanh Hoi and Tantuan. There exists a total of 19 berths of 2,000 m length that can accommodate up to 10,000 DWT vessels (20,000 DWT at high tide). Saigon port has a wide hinterland including HCM City and the Mekong Delta area with a total population of over 20 million. The rapid population increases especially in the cities generates a high growth of cargo movement. The berthing of large vessels is an essential requirement, especially for promoting exports. However, Saigon port has physical restrictions that constrain capacity expansion due to limitations of a river port and available port area.

Hai Phong port is located on the Red River in Hai Phong city, about 100 km from the national capital Ha Noi. Hai Phong port berths total 2,500 m in length; including those of the main port and two sub-ports. The main port berth can accommodate up to a 7,000 DWT vessel with its 7.5 m water depth. However, because of depth limitations (4 to 5 m) along the 37 km access channel, only 3,000 DWT vessel can normally be accommodated (7,000 DWT with high tide). Hai Phong port has expended considerable sums due to increasing maintenance requirements; annual dredging volume, for example, has reached more than 3 million cubic meters. This implies a cost of about US$ 10 million at an assumed unit cost is US$ 3 per cubic meter.

3) Specialized Ports For Coal And Oil

(1) Overview Of The Specialized Ports

The Table 14.1.4 shows the location, facilities, and throughput of specialized ports.

Table 14.1.4 Characteristics of Specialized Ports

Type of Port	Name of Port	Location	Facilities	Throughput
Coal Port	Cua Ong Port	Quang Ninh Province	Main Port: 2 berths 300 m length 9.5 m depth Satellite: 3 berths (only 1 berth is available)	1.5 million tons (1992) (1.1 million tons for export) (0.4 million tons for domestic)
	Hong Gai Port	Quang Ninh Province Periphery of Hong Gai town and within Halong Bay	1 berth 200m length 8m depth	0.82 million tons (1992)
Oil Port	B-12 Port	Between Hong Gai and Cailan port	10.5m depth	0.69 million tons (1992)
	My Khe Port	Nam Tho area (just south side of Da Nang port)	13m depth	0.7 million tons (1994)
	Nha Be Port	15 km from Ho Chi Minh City (downstream from Dongnai estuary)		0.65 - 0.96 million tons

(2) Main Characteristic Of The Specialized Ports

The specialized coal and oil ports are managed by the Ministry of Energy, Ministry of Industry and other ministries. Viet Nam has three main ports accessible for big oil vessels, located in the Northern, Central and Southern regions. The oil ports are under management of Ministry of Industry.

a) Coal Port

Cua Ong port belongs to Quang Ninh Province. The port consists of a main port for ocean-going export vessels and a satellite port for domestic supply barges.

Hong Gai port also belongs to Quang Ninh Province and is located near HongGai town within Halong Bay. Halong Bay is a world-famous tourist spot featuring hundreds of small islands, and has already been designated as an "International Heritage." The potential for environmental conflicts is therefore pronounced. Due to this environmental concern, the scale of the new Cailan port, which is located about 3 km from Hong Gai port, would be restricted.

b) Oil Port

B-12 Port is located between Hong Gai and Cailan port. A pontoon is used as the berthing facility.

My Khe Port is located in the Nam Tho area, just south side of Da Nang Bay. This oilport can only accommodate ocean-going vessels of 35,000 – 40,000 DWT. The port features a single mooring buoy system, 1.7 km offshore with a depth of 13m. Imported oil in 1994 totaled 700,000 tons.

Nha Be Port, located in Ho Chi Minh City, downstream from the Dongnai estuary, shares the access channel with Saigon port. Oil throughput accounts for 50– 60% of the national total of 1.3 – 1.6 millions /year.

4) Local Ports

(1) Overview Of Local Ports

The following table shows main characteristics and throughput of local ports.

Table 14.1.5 Main Characteristics and Throughput of Local Port

No.	Name Of Port	Location (Province)	Vessel Size (t)	Berth Length (m)	Average Port Throughput (tons /year)	Remarks
1	Cua Cam	Hai Phong	5,000	265	100,000	
2	Diem Dien	Thai Binh	1,000	*	*	F/S ready
3	Hai Thinh	Nam Ha	1,000	*	*	
4	Le Mon	Thanh Hoa	1,000	87	80,000	
5	Xuan Hai	Ha Thinh	1,000	*	*	F/S ready
6	Dong Ha	Quang Tri	400	80	100,000	
7	Cua Viet	Quang Tri	*	*	*	F/S under way
8	Thuan An	Thua Thien	1,000	50	50,000	Improvement F/S Underway
9	Sa Ky	Quang Ngai	1,000	-	100,000	
10	Thi Nai	Binh Dinh	5,000	40	50,000	Under Construction
11	Ben Nghe	Tp. HCM	15,000	353	1,000,000	Recent Years
12	Tran Quoc Toan	Dong Thap	2,000	67	120,000	
13	Vinh Thai	Cuu Long	3,000	80	30,000	
14	My Thoi	An Giang	3,000	76	80,000	
15	Hon Chong	Kien Giang	5,000	60	50,000	
16	My Tho	Tien Giang	3,000	165	30,000	
17	Ca Mau	Minh Hai	400	70	Inactive	

* Data not available

In general terms:

- Access channels of local ports (except Ben-Nghe port) are very shallow due to siltation or sedimentation.

- Most of port facilities and cargo handling equipment are outdated and require rehabilitation.

(2) Main Characteristic Of The Local Ports

The local ports are sited almost exclusively in coastal provinces and are managed by Provincial governments. Among the 17 local ports, only Ben Nghe port in HCM City is relatively large, although the throughput of all ports is increasing.

14.1.2 Existing Condition of ports in The Study Area

1) Natural Conditions

(1) Wind

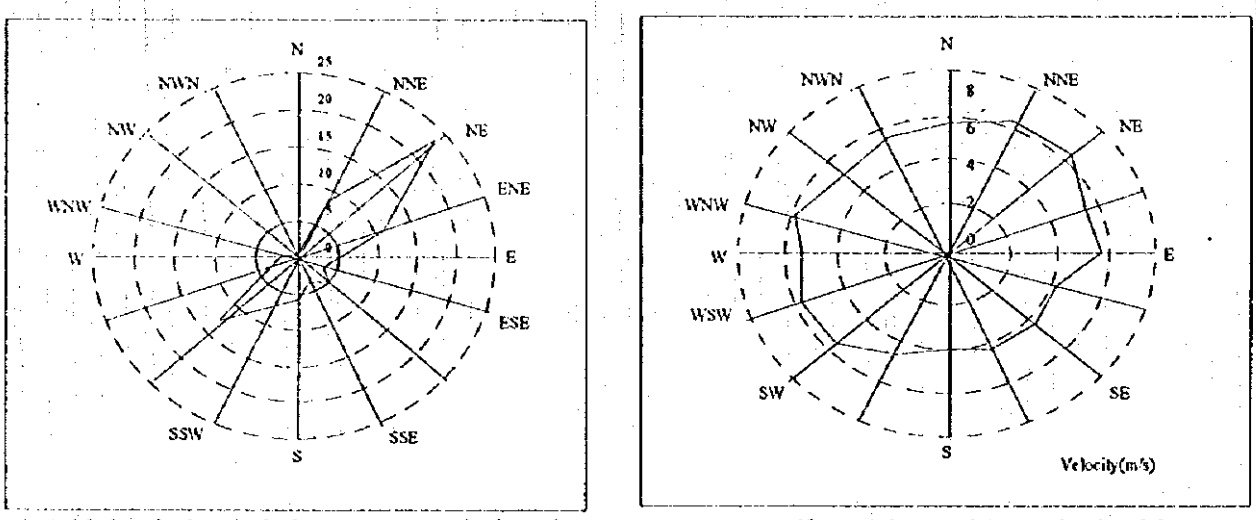
According to the observed 1980 - 1988 data at Quang Ngai Meteorology Gauging Station, maximum annual wind speed ranged from 14m/s to 28m/s, with the latter observed during October 1986. Speeds of 20m/s were observed twice during May 1988 and October 1985. Other observed data fell below 17m/s. The following table and figure show the distribution of wind frequency and velocity.

Table 14.1.6 Distribution of Wind Frequency and Velocity

Direction	N	NNE	NE	ENE	E	ESE	SE	SSE
Frequency (%)	1.5	8.0	24.0	12.0	5.0	3.0	5.0	4.0
Wind velocity (m/s)	5.6	6.2	6.2	5.4	4.7	4.4	4.6	4.1

Direction	S	SSW	SW	WSW	W	WNW	NW	NNW
Frequency (%)	6.0	8.0	13.0	4.0	3.0	1.0	1.5	1.0
Wind velocity (m/s)	4.9	5.6	5.5	5.6	5.0	5.9	5.3	5.4

Figure 14.1.2 Distribution of Wind Frequency and Velocity



A high wind speed always occurs during the summer season (from May to November) with a maximum observed value of 40 m/s.

(2) Tide And Current

Average sea level at the site is 1.2 m; 1.5 to 2.0 m at high tide and 0.5 m at low tide.

The maximum tidal current with astronomical circle (18.7 years) is about 1m/s and usually is from 0.3 to 0.5m/s.

2) Existing Ports

Each province of the study area has existing ports listed in Table 14.1.7. The existing ports are Dog Ha port, Thuan An port, Da Nang port, My Khe port and Sa Ky port.

Table 14.1.7 Existing Ports in the Study Area

Province	Existing Port	Average annual throughput (thousand tons)
Quang Tri	Dong Ha	30
Thua Thien-Hue	Thuan An	100
Quang Nam-Da Nang	Da Nang My Khe	830 700
Quang Ngai	Sa Ky	20

Notes: 1. Da Nang Port is managed by VINAMARINE and My Khe Port is oil port managed by Ministry of Industry

2. Throughput of Da Nang Port is that of 1995 and My Khe Port is 1994

Da Nang port is the third busiest port in the country accommodating about 830,000 tons of cargo in 1995. My Khe port handled about 700,000 tons of oil in 1994. The respective average yearly throughputs of Dong Ha port, Tuan An and Sa Ky port are 30,000, 100,000 and 20,000 tons, respectively.

Even with its pronounced throughput, Da Nang port accounted for only 6% of the total 1995 throughput for all VINAMARINE ports (refer Table 14.1.3). During 1995, Saigon port alone accounted for 50% of VINAMARINE port throughput, followed by Hai Phong port with 31%. The two ports combine represent some 81% of the total at VINAMARINE ports activity, and more than half of total throughput of all Vietnamese ports.

Table 14.1.8 shows the berthing facilities and cargo-throughput of each port in the study area, with additional details presented in the following paragraphs.

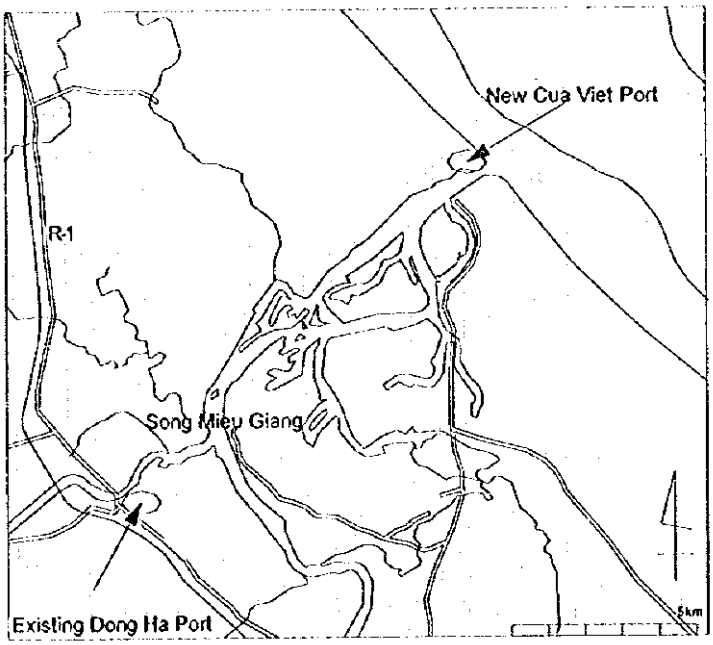
(1) Cua Viet Port, Quang Tri Province

The existing port, located near Dong Ha city, is sited 14 km upstream from the mouth of Cua Viet River. It was constructed during the American war by American military forces (See Figure 14.1.3). This port can only be used by small crafts and barges of up to 400 DWT. Annual port throughput reached 30,000 tons in 1995.

One new pier is now under construction at the mouth of Mien Giang River, about 15 km northeast of Dong Ha City. Water depth at the site of the new wharf is currently 2–5 m. This will be extended to 7.2m at the berth and 6.9m along the 2 km approach channel.

Maintenance dredging is also required. Full details regarding plans for this port are summarized in the "Cua Viet Port Development Plan."

Figure 14.1.3 Location of Cua Viet port



(2) Thuan An Port, Thua Thien-Hue Province

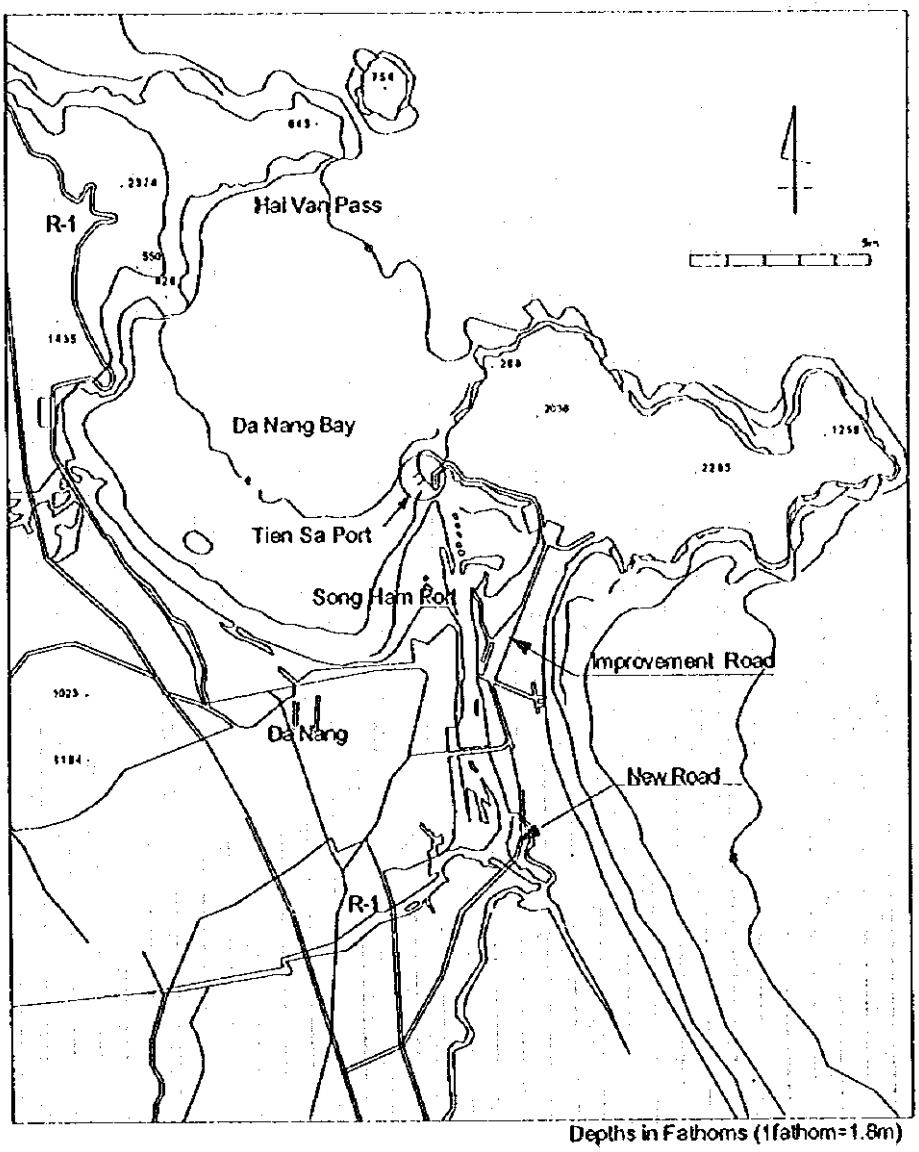
Thuan An Port is located inside of a lagoon, some 10 km north of Hue City. This port was built during the American war by American military forces. The port features 240 m long berth, which can accommodate vessels of up to 1,000 DWT.

Annual throughput in 1995 including by lighterages was 100,000 tons. About 3,000 passengers visited the port in 1994 from ocean-going cruise-ships anchored offshore.

(3) Da Nang Port

Da Nang commercial port, as shown in Figure 14.1.4, consists of two sub-ports: Tien Sa port (Figure 14.1.5), located on Tien Sa peninsula, and Song Han port, located on the Han River. In addition, oil terminals are provided at My Khe and Hai Hiem.

Figure 14.1.4 Location of Da Nang Port



Several problems exist at Tien Sa port. The port features 4 berths but a new breakwater is needed to accommodate vessels during the monsoon season. Also, rehabilitation of the access road system is needed including improvement of Song Han Bridge. Modern cargo handling equipment must be acquired.

One new container wharf of 164 m length and water depth of 11 m is scheduled for construction in 1996 and could accommodate maximum 15,000 DWT vessels. Total capacity of Tien Sa and Song Han ports including the new container wharf is therefore estimated as 2.2 million tons a year.

The east side of Da Nang Bay is very shallow due to siltation from the Song Han River, which is used by the navy and as a fishing boat docking area. Along the west side (Lien Chieu), the bay faces the open sea; since the mouth of the bay is seven to 8 km wide, wave intrusion is pronounced during the monsoon season.

Table 14.1.8 Port Facilities and Throughput of Ports in Viet Nam

Region	Port	Kind	Quay / Berth		Access Channel / Location			Accommodating Max. Vessel DWT	Throughput t / year	Remarks
			Length (m)	Depth (m)	Length (km)	Width (m)	Depth (m)			
1. Q.Tri	Dong Ha River	Commercial	80	-5.0	14		-2.0	400	30,000 ('95)	
	Cua Viet	Commercial	64	-7.2	2	60	-6.9	2,000	Estimate 1.0 Mil. t	Under construction
2. TT-Hue	Thuan An	Commercial	240	-3.7	3		-3.5	1,000	80,000 ('94) 100,000 ('95)	
3. QN-Da Nang	Tien Sa	Commercial	4 x 182	-9.0				15,000		No. of vessels Incl. Song Han Port
									380,000 ('93) 1)	257
									670,000 ('94)	198
									830,000 ('95)	225
	(Tien Sa *1)	New container wharf	165	-12.0				20,000		*1) Planning stage, start construction this year
	Song Han	Gen. Cargo / passenger	8 Quays	-3.6, -6.0	4	60	-6.0	6,000	Approximately 20% of total volume	
	My Khe	Oil	Buoy	-13.0				50,000	700,000 (Import)	At the south coast of Son Tra Peninsula Lien Chieu Area
	Nai Hien	Oil	Buoy	-7.0				5,000	70,000	Constructed on Nov. 1994
4. Quang Ngai	Sa Ky	Commercial	50	-3.5	2	50	-4.0	700	20,000 ('95)	
Major Port										
Ho Chi Minh City	Sai Gon	Commercial	19 Berths Appr. 2,000	-6.5~13.7	89	200	-9.5	15,000	5.5 Mil t ('93) 6.4 Mil t ('94) 7.2 Mil t ('95)	River Port,daytime entry only
Hai Phong City	Hai Phong	Commercial	17 berths	-7.5	37	80~100	-6.0	5,000	2.7 Mil t ('93) 3.2 Mil t ('94) 4.5 Mil t ('95)	River Port,daytime entry only
Total of 8 Commercial ports managed by Ministry of Transportation (VINAMARINE)									10.0 Mil. t ('93) 11.9 Mil. t ('94) 14.5 Mil. t ('95)	
National total									22.0 Mil. t ('93) 25.8 Mil. t ('94) 30.4 Mil. t ('95)	

Figure 14.1.5 Existing Tien Sa Port and New container Wharf, Da Nang Port