7.5 Traffic Management and Safety

1) Traffic Management

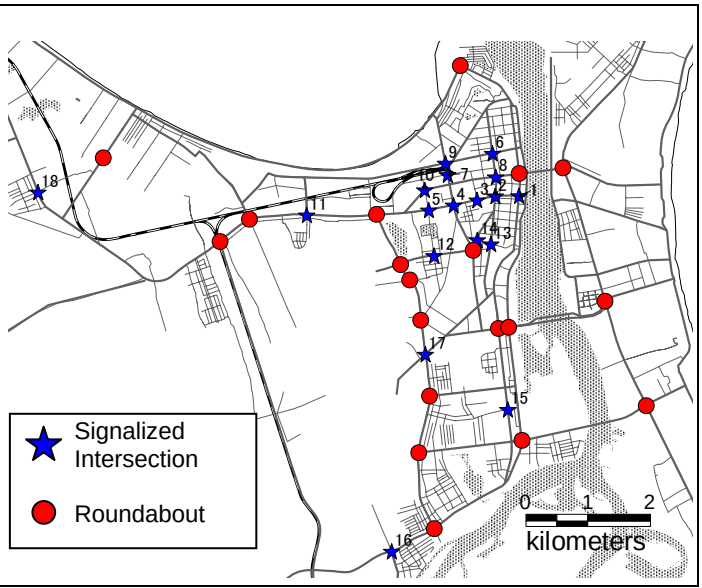
(1) Traffic Control at Intersections

7.30 There are nearly 2,700 road intersections in Danang at present. Of this number 18 are controlled by traffic lights, 27 are operated as roundabouts, eight are controlled by traffic policemen, and about 2% have some sort of traffic control. The remaining intersections are not controlled at all.

7.31 The location of signalized intersections and roundabouts are shown in Figure 7.5.1. Signalized intersections are mainly the major roads in the city center which include the main east–west roads of Hung Vuong, Le Duan, and Dien Bien Phu, as well as main north–south roads of Ong Ich Khiem, Le Loi, etc. Roundabouts are mainly installed at intersections with wide widths.

Figure 7.5.1 Signalized Intersections/Roundabouts in Danang City, 2008

Signalized Intersections:
1. Hung Vuong–Tran Phu
2. Hung Vuong–Phan Chu trinh
3. Hung Vuong–Ngo Gia Tu
4. Hung Vuong–Ong Ich Khiem
5. Hung Vuong–Hoang Hoa Tham–Ly Thai To–Ham Nghi
6. Quang Trung–Le Loi
7. Hai Phong–Ong Ich Khiem
8. Le Duan–Le Loi
9. Le Duan–Ong Ich Khiem
10. Le Duan–Hoang Hoa Tham
11. Dien Bien Phu–Ha Huy Tap
12. Nguyen Van Linh–Ham Nghi - Dinh Ly
13. Le Dinh Duong–Phan Chu Trinh
14. Le Dinh Duong–Hoang Dieu
15. Nui Thanh–Phan Dang Luu
16. Cach Mang Thang Tam–Ong Ich Duong
17. Nguyen Huu Tho–Trung Nu Vuong
18. Ton Duc Thang–Ngo Van So–Ngo Thi Nham



Source: DOT, Danang.

Traffic Lights

Roundabout

(2) One-way Traffic Operation

7.32 One-way traffic operation is implemented only on Bach Dang and Tran Phu streets, which are located in the city center along the west side of the Han River. These streets are parallel to each other, with Bach Dang accommodating traffic headed northward and Tran Phu, southward.

(3) Truck Ban

7.33 Truck ban is implemented in Danang City to avoid traffic conflict between truck traffic and other traffic in the city center. In principle, it bans trucks from plying the urban roads and stipulates the roads where trucks are allowed to run but still under certain conditions (see Figure 7.5.2).

7.34 In addition, trucks with a capacity of 3.5 tons are permitted to run on the following streets except during rush hours in the morning (6:30-8:00) and afternoon (16:30-18:30):

(i) Tran Cao Van, Duy Tan, Le Quy Don, Nui Thanh and 30 Thang 4 (entire section);

(ii) Ong Ich Khiem (Quang Trung–Nguyen Tat Thanh);

(iii) Quang Trung (Ong Ich Khiem–Nguyen Thi Minh Khai);

(iv) Dong Da (Quang Trung–Tran Phu);

(v) Ha Huy Tap (Dien Bien Phu–Tran Cao Van);

(vi) Dien Bien Phu (Nguyen Tri Phuong–Le Duan);

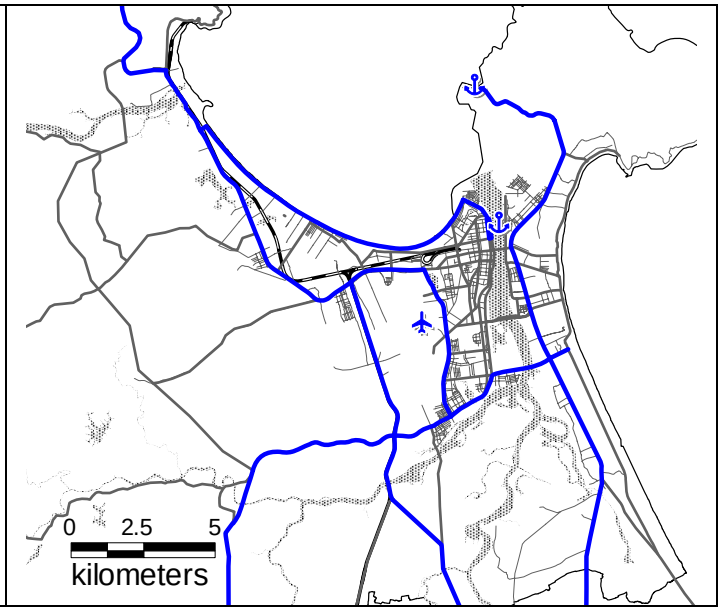
(vii) Le Duan (Dien Bien Phu–Nguyen Thi Minh Khai);

(viii) Nguyen Thi Minh Khai (Le Duan–Quang Trung); and

(ix) Nguyen Tri Phuong (Nguyen Huu Tho–Nui Thanh and Nguyen Tri Phuong–Nguyen Huu Tho).

Figure 7.5.2 Roads Excluded from the Truck Ban in Danang City

Roads:
1. From the south of Hai Van Tunnel to Tuy Loan road, Ta Quang Buu, National Highway 1 (inside Da Nang city including Nguyen Van Cu road, Nguyen Luong Bang, Ton Duc Thang and Truong Chinh)
2. Nguyen Tat Thanh road, 3 thang 2 and Tran Phu (Dong Da-Ly Tu Trong), Bach Dang (Ly Tu Trong-Dong Da), Ly Tu Trong (Bach Dang-Tran Phu)
3. Tran Dai Nghia road and Le Van Hien road
4. National Highway 14B (inside Da Nang City, including Yet Kieu road, Ngo Quyen, Ngu Hanh Son, road leading to Tuyen Son bridge, Cach mang thang 8), 2 thang 9 (from the road leading to Tuyen Son bridge to Cach mang thang 8)
5. Dien Bien Phu (Hue junction-Nguyen Tri Phuong), Nguyen Tri Phuong (Dien Bien Phu-Nguyen Huu Tho); Nguyen Huu Tho (Nguyen Tri Phuong-Cach mang thang 8).



Source: DOT, Danang.

2) Traffic Safety

(1) General Context

7.35 The situation of traffic safety is worsening nationwide. It is even getting more serious than that in other Southeast Asian countries due to rapid economic growth and increasing number of motorized vehicles such as motorcycles and cars. Due to significant human costs and economic losses, traffic accidents have become a critical social problem and traffic safety has evolved into one of the urgent policy issues the government has to address.

7.36 In Danang and its neighboring areas, traffic accidents are a social menace. In 2006 alone, the number of fatalities from traffic accidents was about 1,000. In addition to the nationwide actions, various traffic safety measures appropriate for local conditions are expected to be considered and implemented by local governments.

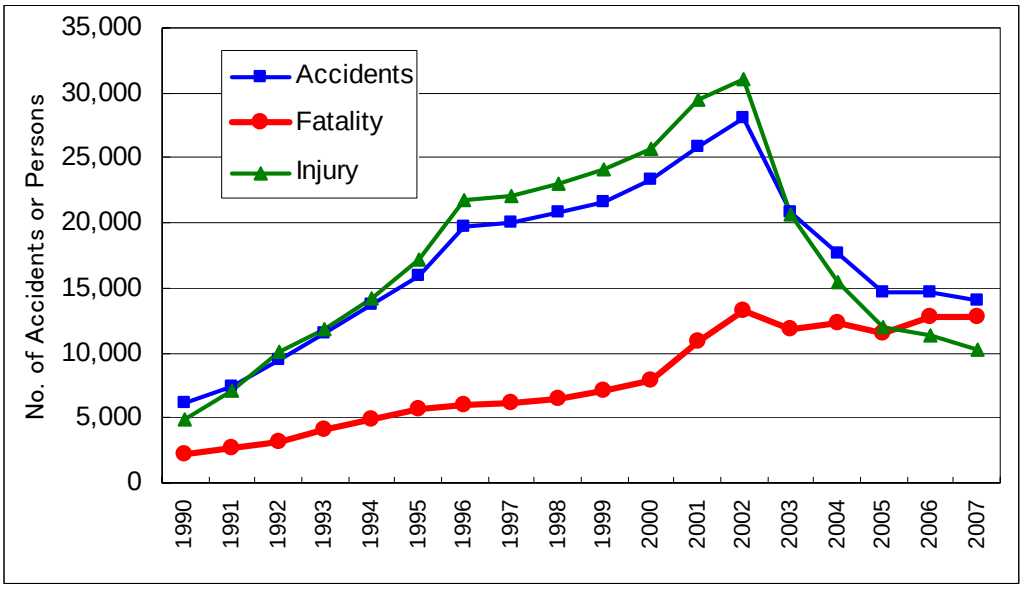
7.37 In this section, the current situation of traffic accidents and countermeasures in Danang and the rest of CFEZ are reviewed. Problems and issues are identified for further improvement. Since road figures more dominantly in traffic accidents, mainly road traffic accidents, including those at railway crossings, are discussed in this section. An analysis of road traffic accidents is made based mainly on data and information provided by the National Traffic Safety Committee (NTSC) and Ministry of Public Security (MOPS).

(2) National Trend

7.38 Figure 7.5.3 shows the annual number of road traffic accidents, fatalities, and injuries from 1992 to 2007. In 2007, there were 13,985 serious road traffic accidents which resulted in 12,800 fatalities and 10,266 injuries. Road traffic accidents increased rapidly from 1990 peaking in 2002, at a rate of 13.5% a year. During this 12-year period, the number of fatalities increased 5.8 times. The number of serious accidents, fatalities, and injuries reached 27,993, 13,186 and 30,999, respectively. However, the number of traffic accidents and injuries dramatically fell after 2003, although the number of fatalities remained high and relatively constant at around 12,000 a year.

7.39 There may be systematic bias in the reported data on road traffic accidents since 0.92 fatalities per accidents in Vietnam (2007) is extremely high in comparison with the figure in neighboring countries. The corresponding ratios are 0.17 in Thailand and 0.02 in Malaysia (2000). A fairly constant number of fatalities from 2002 to 2007 in contrast to rapidly declining number of accidents and injuries in the same period also point to statistical inconsistency. Significant underreporting of accidents and injuries are suspected relative to the number of fatalities, which is considered more reliable.

Figure 7.5.3 Trend in Road Traffic Accidents in Vietnam, 1990–2007



Source: National Traffic Safety Committee

(3) Trend in CFEZ

7.40 As shown in Table 7.5.1, in CFEZ the number of road traffic accidents and injuries decreased in recent years. In 2006, the total number of serious accidents and injuries were 1,186 and 970, respectively. However, the number of fatalities slightly increased, at 1,009 fatalities in 2006. The proportion of these figures to the national total is almost the same level as the population ratio of the study area (7.4%). In 2006, Binh Dinh and Quang Nam had high fatality figures, i.e., 332 and 283, respectively, while Danang City registered a lower figure of 101.

Table 7.5.1 Trend in Traffic Accidents in the Study Area, 2002–2006

Item	Year	Danang	T.T. Hue	Quang Nam	Quang Ngai	Binh Dinh	CFEZ	% to VN Total
No. of Traffic Accidents	2002	252	182	510	623	658	2,225	8.8
	2003	198	160	506	467	569	1,900	9.1
	2004	206	134	428	351	380	1,499	8.5
	2005	157	130	338	283	280	1,188	8.1
	2006	130	153	352	246	305	1,186	8.1
No. of Fatalities	2002	152	165	215	142	228	902	6.8
	2003	133	159	245	161	181	879	7.4
	2004	149	141	217	155	227	889	7.3
	2005	133	125	213	164	281	916	7.9
	2006	101	129	283	164	332	1,009	7.9
No. of Injuries	2002	263	136	653	885	1,021	2,958	22.4
	2003	200	73	663	635	803	2,374	20.0
	2004	194	54	561	440	331	1,580	12.9
	2005	166	64	349	315	188	1,082	9.4
	2006	103	73	267	264	263	970	7.6

Source: Road and Rail Transport Division, MOPS.

(4) Fatality Rates

(a) **Fatality Rate per Population:** Table 7.5.2 shows the fatality rate per thousand population by province in 2006. The average rate in the study area (0.16) was slightly higher than the national average (0.14). By province, Binh Dinh and Quang Nam had higher rates of fatality, 0.21 and 0.19, respectively. Danang City showed a relatively lower rate of 0.13, lower than those in Hanoi and HCMC.

(b) **Fatality Rate per Motorized Vehicles:** The number of road traffic accidents has been increasing as the number of motorized vehicles increased. This is due to the rapid motorization that Vietnam has been experiencing since the 1990s. As shown in Table 7.5.2, in the study area the fatality rate per thousand motorized vehicles was relatively higher than the national average for both automobile and motorcycle. By province, Quang Nam showed a higher rate of fatality, 42.3 per thousand automobiles and 1.15 per thousand motorcycles. Compared with large cities, such as Hanoi and HCMC, Danang City posted a relatively higher fatality rate for automobile and lower fatality rate for motorcycle.

Table 7.5.2 Fatality Rates by Traffic Accidents in the Study Area and Selected Cities, 2006

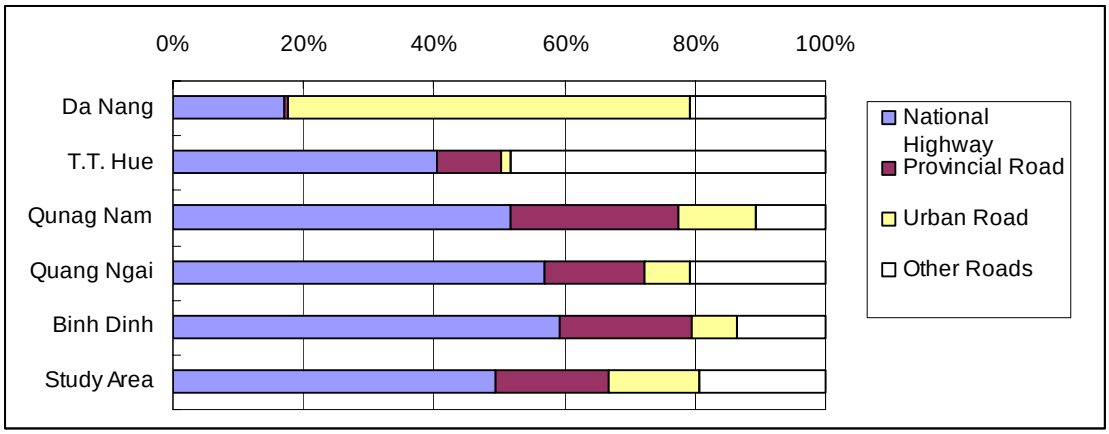
Fatality Rate	Danang	T.T. Hue	Qunag Nam	Quang Ngai	Binh Dinh	Study Area Average	National Average	Hanoi	HCMC
Per 1,000 Pop.	0.13	0.11	0.19	0.13	0.21	0.16	0.14	0.16	0.17
Per 1,000 Cars	5.0	17.3	42.3	26.5	28.8	19.5	14.6	4.0	4.5
Per 1,000 MCs	0.34	0.53	1.15	0.60	1.03	0.73	0.68	0.46	0.30

Source: Road and Rail Transport Division, MOPS

(5) Accident Characteristics

7.41 The location of traffic accidents are shown in Figure 7.5.4 by province. Traffic accidents happened mainly on national highways in the provinces and urban roads in Danang City in proportion to the length of road network and traffic volume.

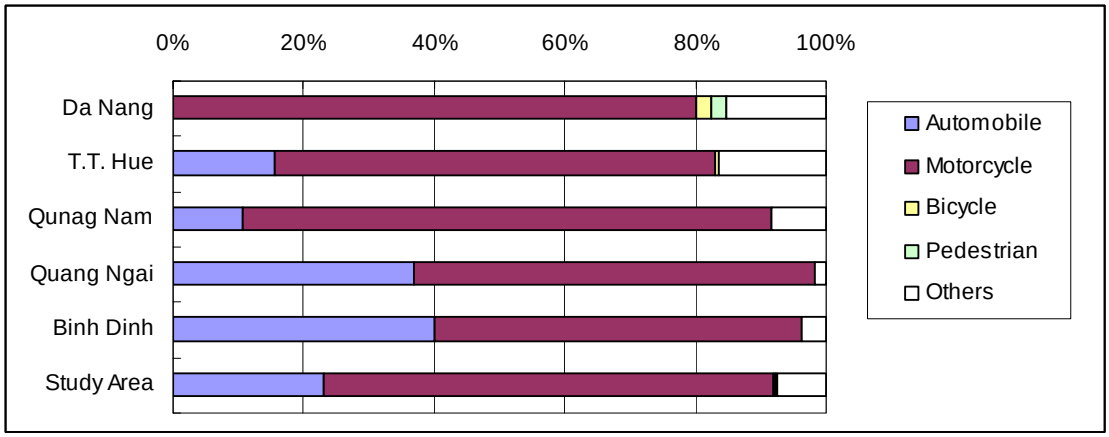
Figure 7.5.4 Location of Traffic Accidents in the Study Area, 2006



Source: Road and Rail Transport Division, MOPS

7.42 Vehicles involved in traffic accidents are shown in Figure 7.5.5 by province. In all provinces within the study area, 50–80% of traffic accidents were caused by motorcycles. Traffic accidents caused by automobiles shared 10–40% in the study area except for Danang City, because traffic speeds tend to be higher in the rural areas. On the other hand, traffic accidents caused by bicycles and pedestrians occurred more often in Danang City than in other provinces.

Figure 7.5.5 Vehicles Involved in Traffic Accidents in the Study Area, 2006

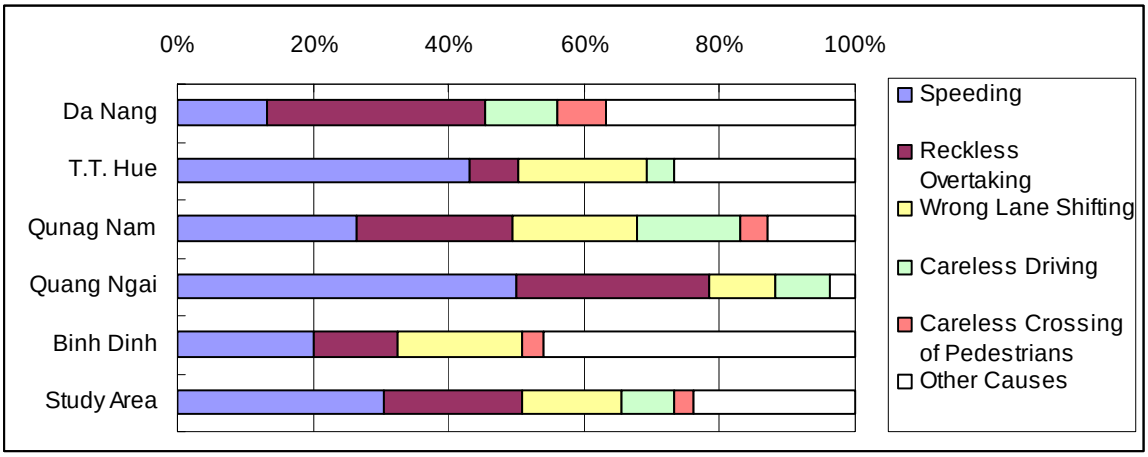


Source: Road and Rail Transport Division, MOPS.

7.43 Figure 7.5.6 shows the causes of traffic accidents by province. Accident causes vary by province but major accident causes in the study area include speeding, reckless overtaking, and shifting to wrong lane, all of which accounted for more than 60% of the total. In Danang City, the most significant cause of traffic accidents was reckless overtaking accounting for about 30% of the total. Other major causes, such as speeding, are not significant because the travel speeds in urban areas are lower. In the four provinces in the study area, speeding is a significant accident cause, particularly in Quang Ngai and Thua Thien Hue provinces, accounting for 50% and 43%, respectively. Reckless overtaking

was a major cause in Quang Ngai and Quang Nam provinces, accounting for 28% and 23%, respectively. Shifting to the wrong lane is the second major cause in Thua Thien Hue, Quang Nam, and Binh Dinh, accounting for more and less 18% of the total.

Figure 7.5.6 Causes of Traffic Accidents in the Study Area, 2006



Source: Road and Rail Transport Division, MOPS.

(6) Traffic Accidents at Railway Crossing

7.44 In Vietnam, there are 1,464 railway crossings managed by the railway company. In addition, the company confirms there are more than 4,252 unauthorized crossing points along the railway that are mainly used by residents. In the study area (including Quang Tri province), there are 352 crossings managed by the railway company. The majority of these crossings have no barriers or gates and nearly half only have warning signs (see Table 7.5.3).

7.45 As for the type of roads crossing the railway, the number of crossings with national highways is 23, 51 with provincial roads, and 17 with district roads (see Table 7.5.4). The remaining 261 locations or 74% of the total are crossings with commune roads or local paths where barriers/gates and automatic warning signs are mostly not available.

Table 7.5.3 Railway Crossings in the Study Area1 by Operation Type, 2007

Railway Company (Province) / Crossing Operation	BTT (Q.Tri, T.T. Hue)	QN-DN (Q.Nam, Danang)	Nghia Binh (Q.Ngai, B.Dinh)	Study Area Total		National Total	
				No.	%	No.	%
1. Warning Signpost Without Barrier	81	36	47	164	47	610	42
2. Automatic Warning Signal Without Barrier	39	19	16	74	21	305	21
3. Manual Lifting Barrier	25	26	11	62	18	317	22
4. Manual Crossing Gate	22	12	16	50	14	206	14
5. Observation by Guards	0	0	0	0	0	3	3
6. Authorized Opening for Residents	1	1	0	2	2	23	1
Total	168	94	90	352	100	1,464	100

Source: Vietnam National Railway.
[1] Including Quang Tri province.

Table 7.5.4 Railway and Road Crossings in the Study Area[1] by Type, 2007

Railway Company (Province) / Crossing Road	BTT (Q.Tri, T.T. Hue)	QN-DN (Q.Nam, Danang)	Nghia Binh (Q.Ngai, B.Dinh)	Study Area Total	
				No.	%
1. National Highway	13	4	6	23	7
2. Provincial Road	21	18	12	51	14
3. District Road	4	5	8	17	5
4. Commune Road/Local Path	130	67	64	261	74
Total	168	94	90	352	100

Source: Vietnam National Railway.
[1] Including Quang Tri province.

Railway Crossing (Dien Bien Phu–Ton Duc Thang/Truong Chinh)

7.46 Table 7.5.5 shows the number of traffic accidents at railway crossings for 19 months from January 2006 to July 2007. In this period, there were 411 and 85 accidents which occurred nationwide and in the study area, respectively. In both areas, most of the accidents took place at illegal crossings which are not managed by the railway company.

7.47 In both areas, more than 70 % of the total number involved trains hitting motorcycles, as shown in Table 7.5.6. In the study area, the case of automobiles hitting barriers accounted for 15% of the total, which is relatively higher than the rate nationwide.

Table 7.5.5 No. of Accidents at Railway Crossings in the Study Area, January 2006–July 2007

Railway Company (Province) / Crossing Type	BTT (Q.Tri, T.T. Hue)	QN-DN (Q.Nam, Danang)	Nghia Binh (Q.Ngai, B.Dinh)	Study Area Total		National Total	
				No.	%	No.	%
1. Warning Signpost	4	0	3	7	8	40	10
2. Automatic Warning Signal	3	2	2	7	8	30	7
3. Manual Barrier/Gate	10	0	3	13	16	35	9
4. Illegal Crossing	16	24	18	58	68	306	74
Total	33	26	26	85	100	411	100

Source: Vietnam National Railway.

Table 7.5.6 Accidents at Railway Crossings in the Study Area by Type, January 2006–July 2007

Railway Company (Province) / Accident Type	BTT (Q.Tri, T.T. Hue)	QN-DN (Q.Nam, Danang)	Nghia Binh (Q.Ngai, B.Dinh)	Study Area Total		National Total	
				No.	%	No.	%
1. Train Stopping due to Obstacle	1	0	1	2	3	32	8
2. Train Hitting Motorcycle	18	24	20	62	73	309	75
3. Train Hitting Automobile	4	2	2	8	9	47	11
4. Automobile Hitting Barrier	10	0	3	13	15	23	6
Total	33	26	26	85	100	411	100

Source: Vietnam National Railway.

7.6 Public Transportation System

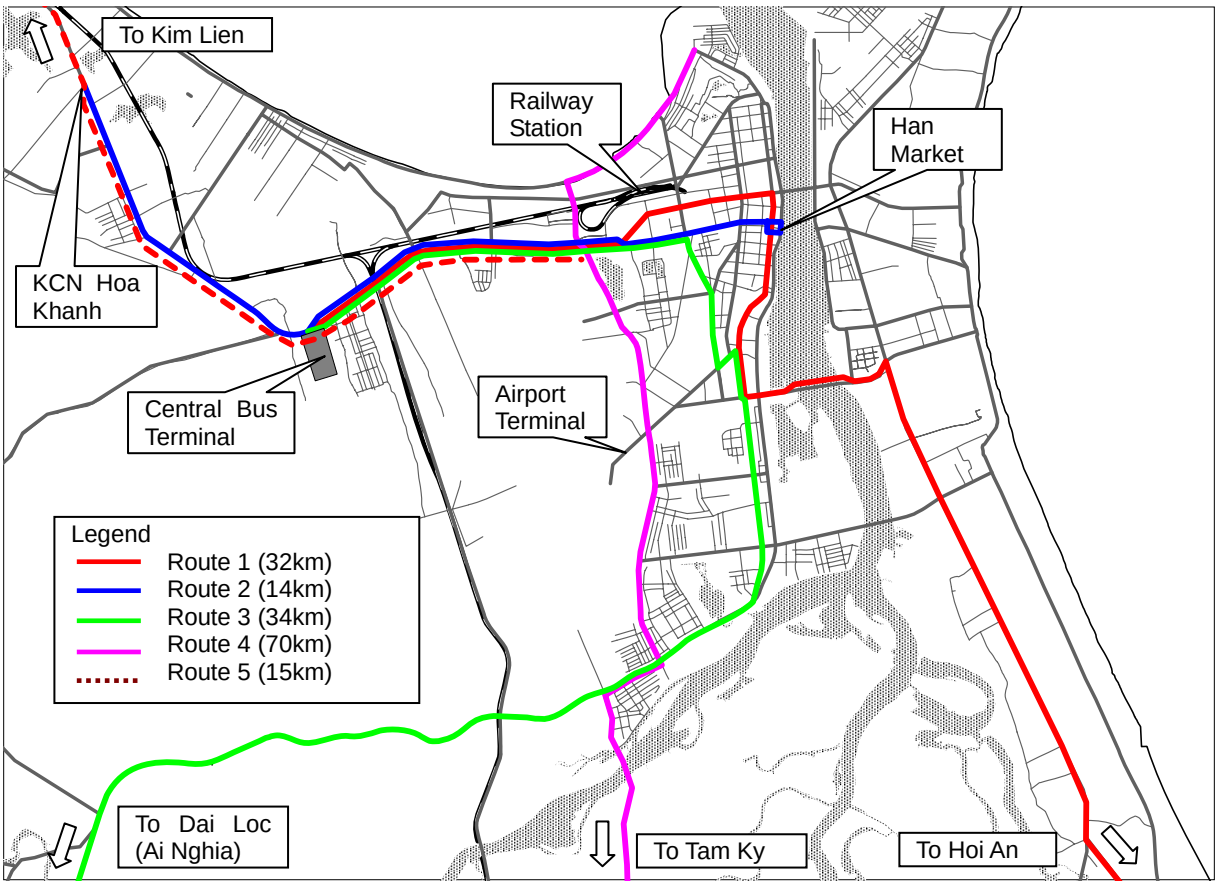
1) Urban Bus Services

(1) Bus Operation and Route Configuration

7.48 At this writing, urban bus services are very limited. There exist five bus routes being operated, three of which (No.1, No.3 and No.4) directly connect the city center with three different towns in Quang Nam Province. Such importance given to these areas is due to the fact that until 1997 Danang and Quang Nam were administered as one province, formerly called Quang Nam-Da Nang. These three routes are also operated jointly by bus companies and cooperatives registered in both Danang and Quang Nam (see Figure 7.6.1, tables 7.6.1 and 7.6.2).

7.49 Route No.1 with a length of 32km starts from the central bus terminal in Hoi An, Quang Nam, passes through the city center of Danang, and ends in Ngu hanh Son District. Route No.2 with a relatively short length of 14 km connects Han Market in Danang City and Hoa Khanh Industrial Zone in Lien Chieu District via NH1A. Route No.3 with a length of 34km connects the central bus terminal in Dai Loc District in Quang Nam, passing through Danang's center, Cam Le and Hoa Vang districts. Route No.4 with a relatively longer length of 70km connects the north of the city center and Tam Ky Town, the provincial capital of Quang Nam via NH1A.

Figure 7.6.1 Urban Bus Route Network in Danang City



Source: DOT, Danang.

7.50 Route No.5 is an informal route. It was retained as an important route when the bus route network was reconfigured in 2001. This route is operated by cooperatives using old and small buses with capacities of 9–12 passengers each.

Table 7.6.1 Urban Bus Services in Danang City

No	Route			Route KM	Fare (VND)	Interval (peak/off-peak)	Operation Time	Operator (Code)[1]	No. of Buses Assigned		No. of Seats
1	Central Bus Terminal	-	Hoi An (Quang Nam)	32	4,000 (by section) 10,000 (full route)	20 min./ 20 min.	05:00-18:00	3 (coop.)	9	17	25-63
								9 (private)	8		
2	Han Market (Bach Dang St.)	-	Hoa Khanh Industrial Zone (Lien Chieu)	14	4,000 (fixed)	10 min./ 15 min.	05:30-18:00	8 (private)	8	8	25/29
3	Central Bus Terminal	-	Dai Loc Bus Terminal	34	4,000 (by section) 10,000 (full route)	30 min./ 30 min.	05:30-18:30	9 (private)	8	11	25-63
								2 (private)	2		
								11 (coop.)	1		
4	Dan Nang (Nguyen Tat Thanh St.)	-	Tam Ky (Quang Nam)	70	4,000/8,000 (Inside/outside DN) 15,000 (full route)	20 min./ 20 min.	05:20-17:50	1 (private)	8	27	28-63
								4 (coop.)	7		
								9 (private)	6		
								10 (coop.)	6		
5	Kim Lien (Lien Chieu)	-	Sieu Thi (Thanh Khe)	15	3,000 (fixed)	15 min./ 15 min.	05:00-18:00	6 (coop.)	17	44	9/12
								7 (coop.)	15		
								5 (coop.)	12		

Source: DOT, Danang

[1] Details of operators are in Table 7.6.2

Table 7.6.2 Profile of Urban Bus Operators in Danang City

Code	Bus Operator Name	Type	Office	Operating Route No.	No. of Buses	No. of Seats	Major Manufactirer
1	Quang Nam Transport Joint Stock Co.	Joint Stock	Quang Nam	4	8	29-50	Hyundai, Daewoo, Transinco
2	Dai Loc Bus Station and Transport Service Co. Ltd.	Private	Quang Nam	3	2	25/32	Asia, Transince
3	Hoi An Tourism & Land/ Waterway Transport Cooperative	Coop.	Quang Nam	1	9	25/35	Tanda, Asia
4	Tam Ky Transport & General Trading Cooperative	Coop.	Quang Nam	4	7	30-51	Hyundai, Asia, Transinco
5	Lien Chieu Da Nang Service & Transport Cooperative	Coop.	Da Nang	5	12	9/12	Suzuki, Daewoo
6	Cam Le Transport Service Cooperative	Coop.	Da Nang	5	17	9-12	Suzuki, Daewoo
7	Dn Nang Transport Cooperative No.1	Coop.	Da Nang	5	15	10/12	Suzuki, Daewoo, Asia
8	Da Nang Transport & Bus Station Management Joint Stock Co.	Joint Stock	Da Nang	2	8	25/29	Tanda, Nadibus
9	Da Nang Trading & Bus Service Joint Stock Co.	Joint Stock	Da Nang	1,3,4	24	40-63	Yuchai, Tata, Transinco
10	Hai Van Transport Service Cooperative	Coop.	Da Nang	4	6	28-50	Tanda, Transinco, Asia, Comtrans
11	Dai Loc Transport Cooperative	Coop.	Quang Nam	3	N.A.	N.A.	N.A.

Source: DOT, Danang.

(2) Ridership and Fare Income

7.51 Although the number of passengers in 2007 increased in all routes, the average bus ridership ranged only from 540 to 1750 passengers a day. From 2006 to 2007, fare income increased as ridership increased. However, the increase in fare income was more than that of ridership due to the rise in average fare by passenger. It should be noted that there is no subsidy from the local government for bus operation (see Table 7.6.3).

Table 7.6.3 Ridership and Fare Income by Bus Route

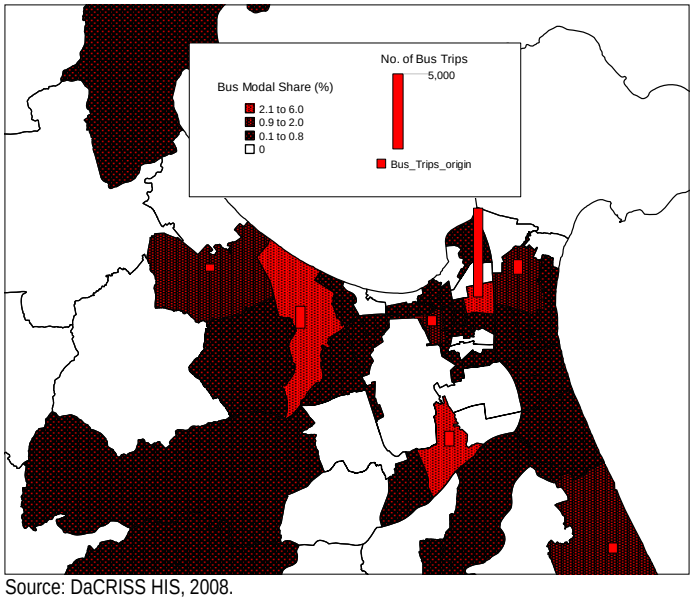
No.	Route	Ridership: passengers/year (daily average)			Fare Income VND mil. (average per passenger)		
		2006	2007	Growth Rate (%)	2006	2007	Growth Rate (%)
1	Central Bus Terminal–Hoi An (Quang Nam)	189,800 (520)	211,700 (580)	11.5	949 (5,000)	1,481 (7,000)	56.1
2	Han Market (Bach Dang St.)–Hoa Khanh Industrial Zone (Lien Chieu)	535,680 (1,468)	638,750 (1,750)	19.2	1,607 (3100)	2,555 (4,000)	59.0
3	Central Bus Terminal–Dai Loc Bus Terminal	153,300 (420)	197,100 (540)	28.6	766 (5,000)	1,182 (6,000)	54.3
4	Dan Nang (Nguyen Tat Thanh St.)–Tam Ky (Quang Nam)	408,800 (1,120)	525,600 (1,440)	28.6	2,452 (6,000)	4,204 (8,000)	71.5
5	Kim Lien (Lien Chieu)–Sieu Thi (Thanh Khe)	N.A	N.A	-	N.A	N.A	-

Source: DOT, Danang.

(3) Modal Shares of Bus

7.52 Motorcycles and bicycles are the dominant modes of transportation in Danang, sharing 77% and 22% of total trips, respectively (excluding walking trips). Although public buses, including both urban and provincial, share only 0.8% of the total, the modal share of bus varies by area, as shown in Figure 7.6.2. From this, relatively higher modal shares of bus are observed in some communes such as Hai Chau 1 (Hai Chau), Hoa Minh (Lien Chieu), Khue Trung (Cam Le), and An Hai Bac (Son Tra).

Figure 7.6.2 Modal Shares of Bus based on Trip Origin by Commune, 2008

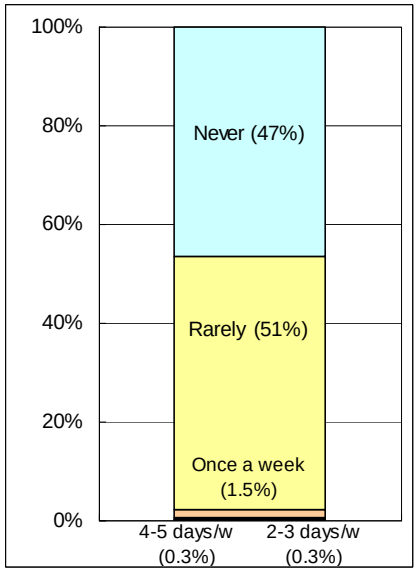


Source: DaCRISS HIS, 2008.

(4) People's Opinion on Bus Services in Danang City

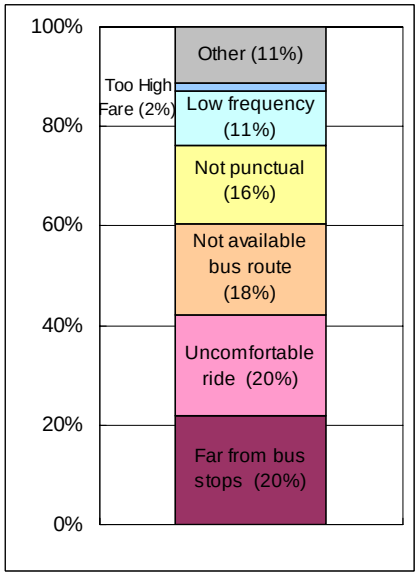
7.53 Based on the results of the HIS Questionnaire No.4 about the people's opinion on transportation environment (the total number of individual respondents is about 15,500), 47% of respondents had no experience of using buses, while 51% used bus rarely (see Figure 7.6.3). According to the people who never used or rarely used buses, their major reasons is the poor level of bus service in terms of availability, comfort, punctuality, and frequency (see Figure 7.6.4).

Figure 7.6.3 Frequency of Bus Use



Source: DaCRISS HIS, 2008 .

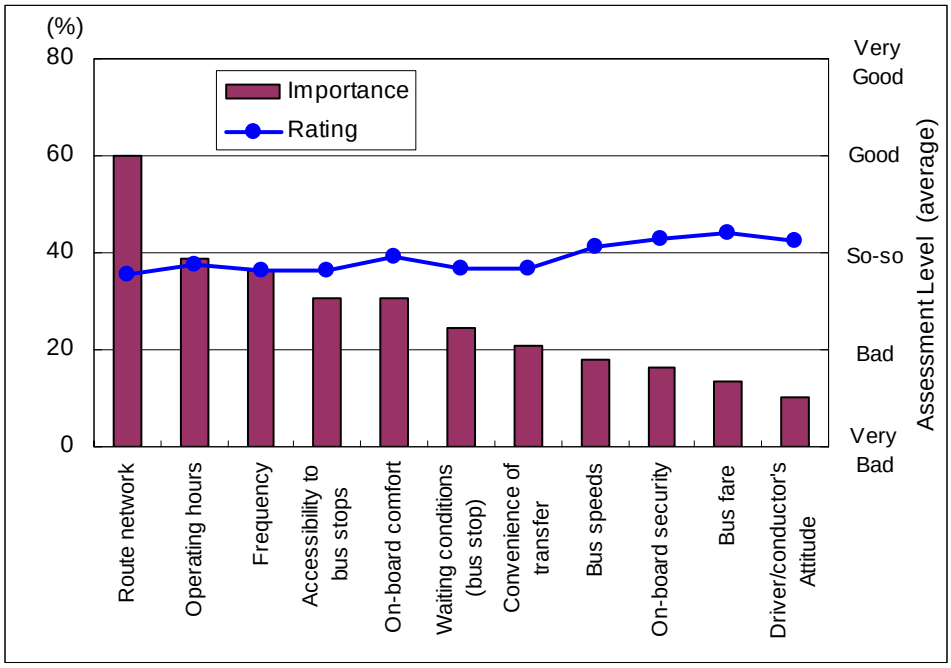
Figure 7.6.4 Reasons for not using Bus Services



Source: DaCRISS HIS, 2008.

7.54 The respondents also assessed some aspects of bus services. Results showed that the most important aspects of bus services are route network (60%), operating hours (39%), and frequency (38%). These same aspects were also assessed as relatively bad, as shown in Figure 7.6.5.

Figure 7.6.5 Public Perception and Assessment of Bus Services



Source: DaCRISS HIS, 2008.

2) Other Road-based Public Transportation Services

7.55 Like other major cities in Vietnam, taxis are available as one of the public transportation services in Danang. In the city center, it is easy to find xe om drivers waiting for passengers. Cyclos are also still available in Danang, but it is mainly used for short-distance trips for passengers and cargoes.

3) Characteristics of Public Transportation Users

7.56 Table 7.6.4 summarized the demand and socio-economic profile of public transportation users by mode. The characteristics of each mode are described as follows:

(a) **Public Bus**: Public bus serves 2,200 trips a day. The average trip length and travel time are 22 km and 23 minutes, respectively. More than 50% of public bus users are students and pupils.

(b) **Private Bus:** This service includes company, school, and tourist buses which make 12,600 trips a day. The average trip length and travel time are relatively longer than those of public buses. Passengers are mostly skilled workers, professionals, and pupils.

(c) **Xe Om:** This is an informal transportation service but makes 24,600 trips a days. Trips done using the xe om are mainly for "private" purposes.

(d) **Cyclo:** This is a conventional public transportation service for short-distance movement, but its operation is being regulated due to the impact it has on traffic. Passengers of cyclo are mostly male aged over 50 years.

(e) **Taxi:** This service serves mainly adults and for "private" purposes.

Table 7.6.4 Characteristics of Public Transportation Users

Item		Taxi	Cyclo	Xe Om	Bus		Total
					Public	Private	
Demand	trips/day	1,170	2,518	24,558	2,238	12,605	43,089
	Ave. Trip Length (km)	14.37	2.90	8.20	21.65	23.39	16.91
	Ave. Travel Time (min.)	12.6	13.7	22.5	22.6	25.7	22.7
Trip Purpose (%)	To Work	28.4	48.6	20.7	13.2	38.2	27.2
	To School	0.0	2.2	0.2	21.1	3.8	2.5
	Business	0.0	0.0	0.0	0.0	6.8	2.0
	Private	36.7	12.8	30.5	16.6	4.5	21.3
	To Home	35.0	36.3	48.6	49.1	46.7	47.0
Age Group (%)	Less than 10	0.0	0.0	0.0	0.0	0.0	0.0
	10–14	0.0	0.0	0.2	10.5	0.4	0.8
	15– 49	65.9	30.0	78.0	76.5	99.6	81.1
	50– 69	34.1	63.4	17.9	5.5	0.0	15.1
	More than 70	0.0	6.6	3.9	7.5	0.0	3.0
Gender (%)	Male	60.4	89.8	48.8	50.5	55.4	53.5
	Female	39.6	10.2	51.2	49.5	44.6	46.5
Major Occupation of Users (%)	No. 1	Skilled Worker (37.4)	Small Vendor (65.2)	Small Vendor (23.6)	Student (32.1)	Skilled Worker (43.6)	Skilled Worker (18.6)
	No. 2	Other (21.9)	Unskilled Worker (26.1)	Own Business (23.2)	Pupil (23.5)	Professional (39.3)	Small Vendor (18.2)
	No. 3	Housewife (15.5)	Own Business (8.7)	Unskilled Worker (15.1)	Skilled Worker (12.6)	Pupil (17.0)	Professional (17.0)

Source: DaCRISS HIS, 2008.

7.7 Main Problems and Issues

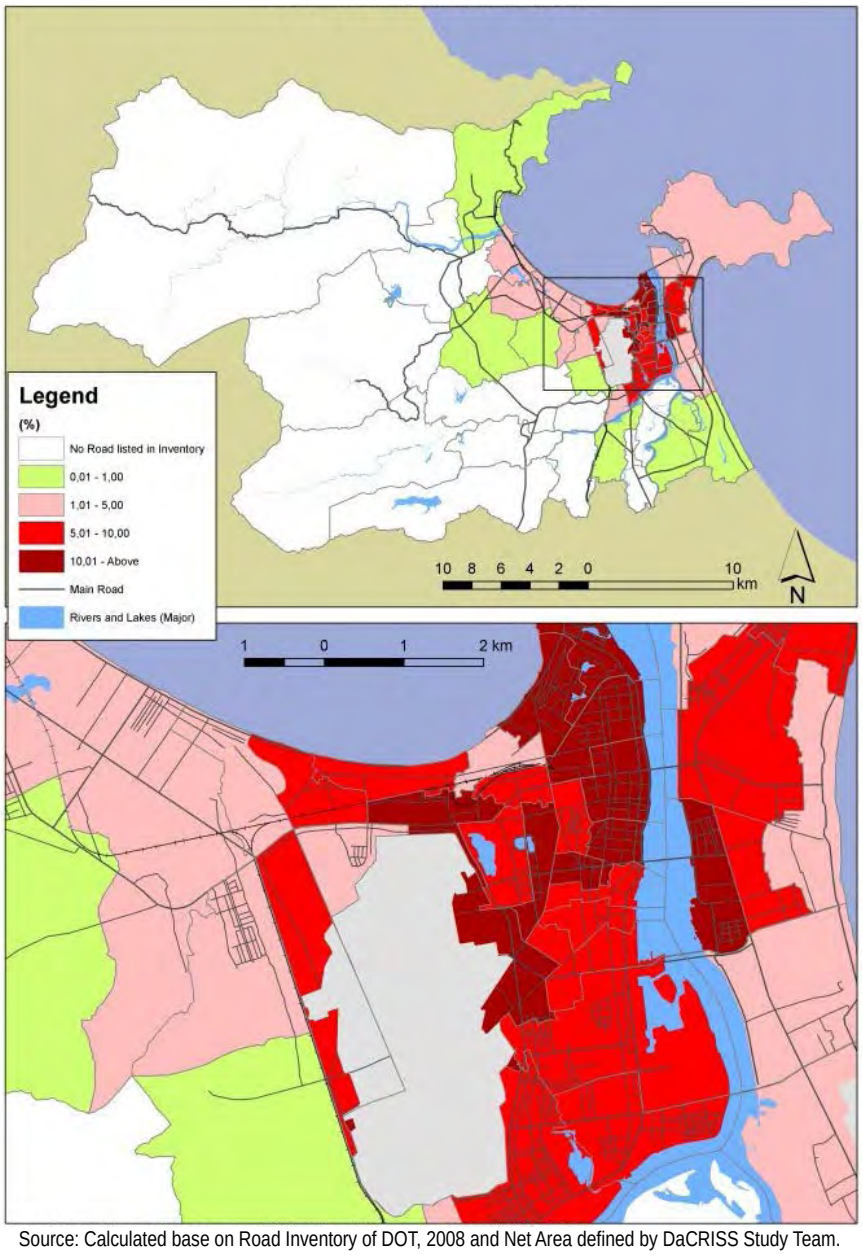
1) Road Network

7.57 Four-lane dual carriageways are desirable for the arterial system, but this feature is currently limited to national highways and a limited number of provincial roads. The main problems of the road network in Danang are as follows:

(1) Insufficient Road Coverage

7.58 Danang has insufficient road space when compared to Tokyo (15.8%), Singapore (12.0%), and Bangkok (8.5%). Its road coverage ratio shown in Figure 7.7.1 is almost comparable to that of Hanoi (4.2% on average and 10.3% in the CBD). In the rural and suburban areas, road quality is poor, and many roads are narrow and unpaved. This results in unequal level of accessibility within Danang, particularly between the city center and the peripheral areas.

Figure 7.7.1 Road Coverage Ratio in Danang by Zone, 2008



Source: Calculated base on Road Inventory of DOT, 2008 and Net Area defined by DaCRISS Study Team.

(2) Irregular and Incomplete Primary Road Network

7.59 The primary roads of Danang are inadequate. There is no clear pattern observed except for the grid pattern in the city center. National highways function as radial roads as well as urban arteries serving the city center. No circumferential urban road has been developed so far. Although these weaknesses in the primary road network does not affect much the urban activities since the built-up area is small and motorcycle is dominant in urban traffic, it will soon become a serious problem when urban development and motorization accelerate.

7.60 Driven by Danang's recent economic expansion, some primary roads are now under construction. However, it is mostly in the city's periphery, and the design standards differ from section to section. Assuming that the desirable minimum design standards for the primary system is a four-lane dual carriageway with a minimum width of 25 m, there are still many sections that need to be improved.

2) Road Facilities

7.61 So far, Danang's transportation and traffic problems are not serious compared with Hanoi and HCMC mainly due to the moderate size of the city. However, this situation will soon change as mentioned earlier. Modal shift from motorcycle to car is actually ongoing. To ensure a favorable living environment in the future and appeal for the tourists, the following problems should be solved or alleviated at the earliest time possible:

(i) Traffic signals are too few. There is a need to increase the number of traffic signals at major intersections, particularly in the periphery of urban centers;

(ii) Sidewalk is provided on many roads in the city center. But its features (i.e., continuity and consistency in width, pavement, gap, etc.) are insufficient. Moreover, sidewalks are mostly occupied by parked motorcycles and food stalls. Parking control should be strengthened; and

(iii) Urban streets are planted with trees, in general. However, its coverage is small compared to Hanoi and HCMC. Particularly, the roads along the Han River should be landscaped to enhance the living environment and attract visitors.

3) Public Transportation

7.62 As stated earlier, the public transportation system is not developed well in Danang. The major issues are:

(i) Urban bus service is limited at present with only five routes operating. At present, the traffic situation in Danang remains favorable, and the public does not feel a lot of inconvenience. However, as the city rapidly urbanizes and expands to the suburbs, this will be one of the biggest issues;

(ii) While the demand for public transportation remains low, urban bus services can be provided by minibuses. This would help secure a certain level of service frequency even for low-demand routes; and

(iii) Railway is underutilized. Currently, provincial buses are mostly used for medium- to long-distance trips instead of railway to/from outside Danang. With the proposed improvement of the existing railway, including the planned relocation of the Danang Station, its service should be upgraded.

4) Traffic Management and Safety

7.63 Traffic safety is a major issue in Danang as well. The major issues are:

(i) Of the total 2,700 road intersections, 18 are controlled by traffic lights, 27 are operated as roundabouts, eight are controlled by traffic policemen, and about 2% have some sort of traffic control. However, the remaining intersections are not controlled at all;

(ii) One-way traffic operation is only conducted in Bach Dang and Tran Phu streets;

(iii) Truck ban is not fully implemented (only under certain conditions);

(iv) The number of traffic accidents is increasing due to the rapid economic growth and increasing number of motorized vehicles such as motorcycles and cars, adding up to more than 100 fatalities in Danang in 2006 alone;

(v) Traffic accidents are dominantly caused by motorcycles in Danang, as the traffic speed for automobiles tends to be higher in the rural areas. However, traffic accidents caused by bicycles and pedestrians occur more often in Danang compared to other provinces; and

(vi) Traffic accidents also occur in railway crossings as well, due to the lack of barriers/gates, illegal crossing, etc.

8 URBAN UTILITIES AND SERVICES

8.1 Overview

8.1 The current condition of urban utilities and services in Danang City are as follows:

(a) **Power Supply:** The growth rate of power consumption in Danang City stands at 7–8% annually, with the peak demand time at noontime during summer. Providing adequate power supply and reliable service to keep up with the rapid increase in demand, developing generation plants and alternative power sources, and controlling demand to keep pace with development.

(b) **Water Supply:** Groundwater is reported to be polluted due to “salutation types” of septic tanks that are being used by residents. Due to this, it has been deemed difficult for groundwater to remain as a water source in the future. In 2007, about 94,000 households (56.9% of the population) had access to safe water. Average consumption of water is currently at 22,502 m^3 per day or 118 liters daily per person. Cu De River is a main source for drinking water. The Department of Construction (DOC) of Danang City has jurisdiction over urban water development, with the Da Nang Water Service Company (DWSC) as water supplier and the Department of Agriculture and Rural Development (DARD) responsible for rural water supply. Improving the centralized system, developing independent suburban systems, reducing water loss, integrating resource management, developing groundwater resources, and building manpower capacity.

(c) **Wastewater Treatment:** Central Danang City has a combined sewerage system; however, only 20% of the capacity of the treatment plant is used. The drainage system is likewise mainly provided in the city center. The sources of pollution include households, hospitals, and industries. The DOT has jurisdiction over drainage and wastewater treatment, while DONRE monitors water quality. Need for a wastewater treatment master plan, control of industrial wastewater, and harmonization of water supply plans.

(d) **Solid Waste Management:** The domestic waste generated within Danang reaches 630 tons a day. Source separation has not been officially introduced and there is no separate facility or equipment to treat industrial waste. DONRE has jurisdiction over domestic waste, while URENCO is the only entity which collects domestic waste. Need for measures for treating industrial and hazardous wastes, as well as reducing landfill waste.

(e) **HIS Results on Urban Utilities and Services:** Based on HIS results, core districts have a high connectivity rate to piped water services, while other areas don’t have. Most residents have access to flushing toilets. Most people felt that the most important aspect in water supply is improving its quality. The people also voiced the need for more public toilets in parks, areas near water bodies, and along major roads, as well as the need to improve drainage conditions.

8.2 Power Supply

1) Power Consumption in 2008

8.2 Table 8.2.1 shows the energy consumption of Danang City in the first four months of 2008.

Table 8.2.1 Power Consumption in Danang City, January–April 2008

Category	Consumption(Mwh)	Ratio (%)
Agriculture, Forestry, and Fishery	376	0.1
Industry and,Construction	153,417	49.9
Commercial, Hotel and Resturant	22,201	7.2
Consumer	118,599	38.5
Others	13,096	4.3
Total	307,688	100.0

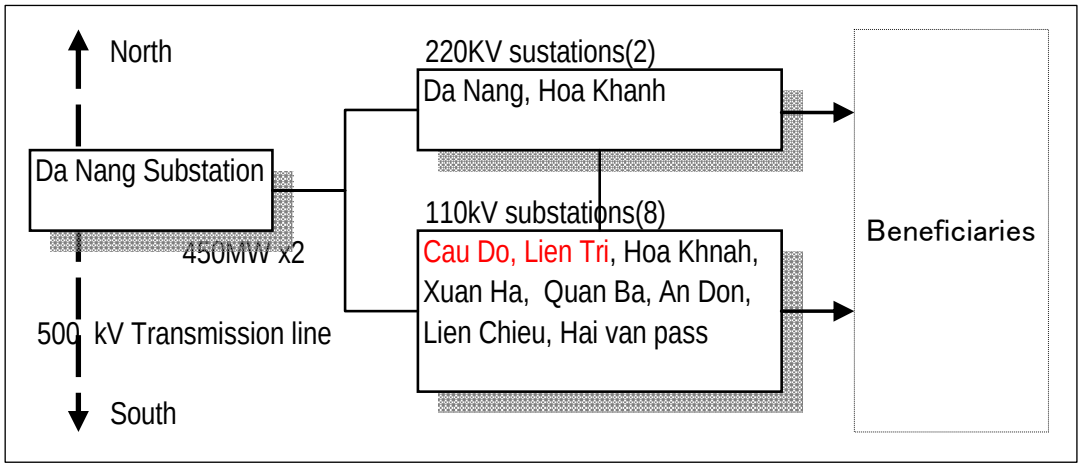
Note: Compiled by the DaCRISS Study Team based on available documents.

8.3 The peak demand time for electricity is noontime in summer. The growth rate of consumption is estimated at 7–8% annually. It is believed that the development of power facilities cannot keep up with the rapid increase in demand, as evidenced by scheduled power cutoffs during peak demand period in the dry season. In addition, frequent power voltage fluctuations affecting the operation of sensitive equipment in the industrial zone. Some factories in industrial estates hope that power supply will improve.

2) Network and System

8.4 There is no large generation plant in Danang. Power is mainly supplied through the national grid. Only two independent power plants (IPPs) were planned to be operated by the joint stock company in the near future. Medium- to small-scale hydropower plants are also either planned or are being constructed in the Vu Gia River basin in Quang Nam. Hydropower and thermal power sources are also going to be developed. In the 6th power development master plan, the intention to develop renewable energy sources was indicated, while the vision for introducing nuclear power generation plants was included. The Danang substation is the only substation which has two 450MW transformers and thus plays a key role in power supply in the city. Figure 8.2.1 shows the current supply network which covers all the areas in Danang City.

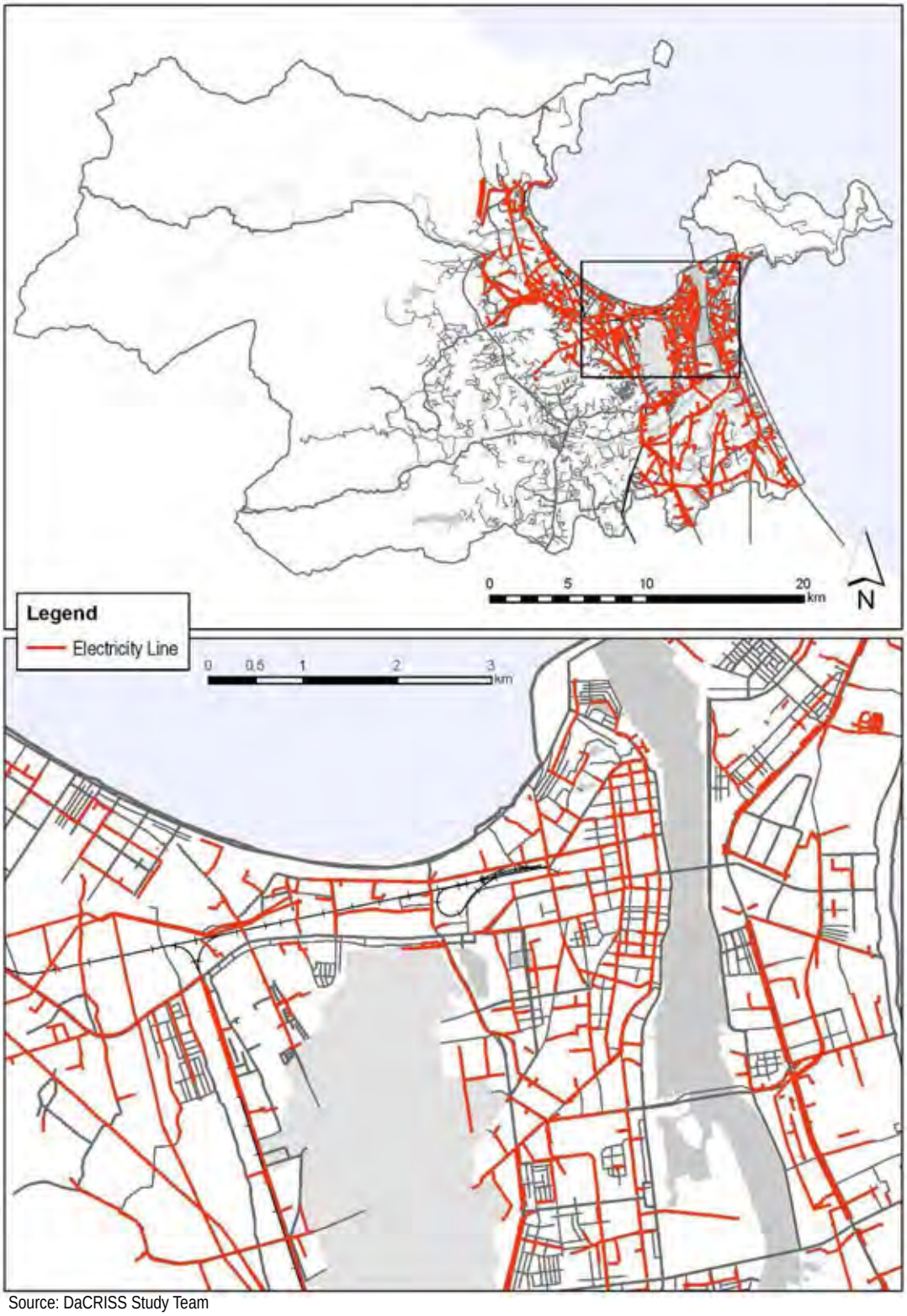
Figure 8.2.1 Power Supply Network in Danang City



Source: DaCRISS Study Team.

8.5 The power supply network in Danang City was developed based on the "Electric Development Plan for Danang City for Period 2007–2010 with Orientation to Year 2015." It was developed ahead of schedule due to rapid demand increase. Frequent power failures and fluctuations of supply voltage were reported by consumers. This is due not only to the rapid growth in demand but also to the lack of an integrated monitoring and control system for power demand and supply.

Figure 8.2.2 Electricity Lines in Danang City



Source: DaCRISS Study Team

3) Institutions

8.6 The Danang Power Supply Company is in charge of power supply and distribution in Danang, while EVN (Vietnam Electricity) is in charge of power generation and transmission through the national grid. The Department of Industry and Trade formulated the electrical development plan in Danang City for period of 2007–2010 with the orientation to year 2015 and monitored its progress.

8.7 Profits of the Danang Power Supply Company were 97% higher than planned in 2007. This was because consumption exceeded expectations. As a result, the company was forced to accelerate the development of facilities ahead of schedule. In 2007, the average selling price for power was VND912.05 per kwh. But, a decree by the Prime Minister set a new tariff starting March 2009 with an average increase rate of almost 7%.

8.8 The Danang Power Company and Danang City have worked together mainly on upgrading substations and the distribution network. EVN succeeded in gaining concession for two joint-stock companies to develop hydropower generation plants.

4) Main Issues

(a) **Providing Adequate Power Supply and Reliable Service:** A high consumption rate is expected in the future due to population increases and economic growth. Therefore, continuous effort is required to develop upstream and downstream facilities to ensure reliable service.

(b) **Developing Power Generation and Alternative Energy Sources:** It takes time to develop power generation plants. Taking into account transmission loss, power generation plants should be located close to final consumption areas. It is thus desirable that power plants be planned in the central region. Furthermore, there might be room to introduce measures to reduce carbon emissions in developing countries. Alternative energy sources should also be planned.

(c) **Controlling Power Demand to keep Pace with Facility Development:** Apparently, current capacity and expansion cannot meet the rapid demand increase. Therefore, controlling the demand is one tactic to give enough time to develop alternative and additional power supply facilities. For example, subsidies can be given to introduce the use of fluorescent, instead of incandescent, bulbs. A promotion on power saving might also be effective.

8.3 Water Supply

1) Coverage and Consumption

8.9 A centralized system was developed in the city while independent tube wells were provided in suburban areas. Groundwater is reported to be polluted because the saturation type of septic tanks was used. Therefore, it is difficult to expect groundwater to remain as a water source in the future.

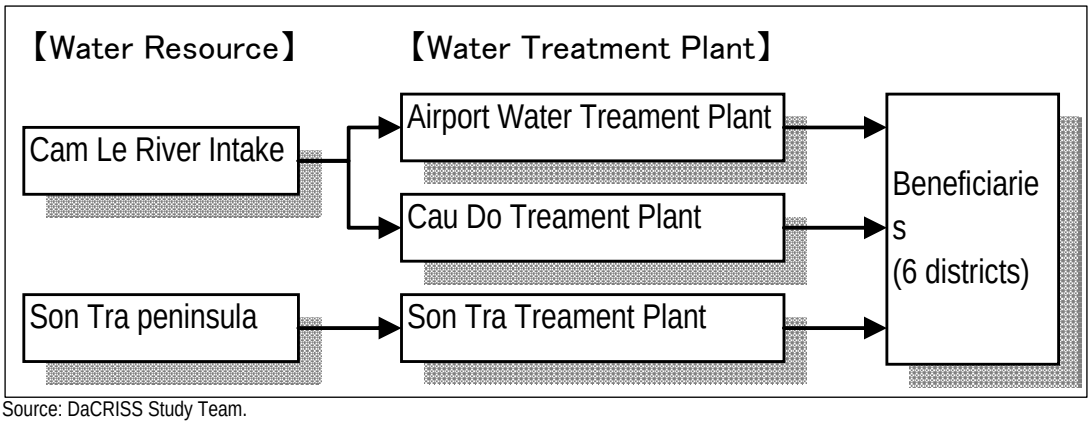
8.10 In 2007, about 94,000 Danang households (56.9% of the population) had access to safe water. The Da Nang Water Service Company (DWSC) plans to extend its water pipeline network in order to provide potable water to 140,000 households by 2010. At present, the average consumption of water is 22,502 m^3 per day or 118 liters daily per person. This figure is expected to increase due to the improvement in the quality of life in the city.

8.11 One of the critical issues in water supply is physical water loss, which reached 40% in 2006. To monitor and control water loss, the DWSC installed water meters at each section. Another issue is the inability of old pipes to handle high-pressure water conveyance. Hence, households located far from the pipeline cannot be supplied with water. HIS results confirmed that there are areas where the people are dissatisfaction with the water supply in their area in terms of flow, time of supply, and quality.

2) Supply Network

(a) **Water Resources and Intake:** Cu De River is a main source for drinking water. Water intake is located more than 10km upstream of the estuary. It is not confirmed if there is sufficient quantities for future demand. In addition, it is reported that saltwater intrudes into the source in dry season. It is said that ADB plans to conduct a feasibility study on water resource exploitation. The water supply network is shown in Figure 8.3.1.

Figure 8.3.1 Water Supply Network in Danang City



Source: DaCRISS Study Team.

(b) **Water Treatment Plant:** The capacities of water treatment plants are summarized in Table 8.3.1.

Table 8.3.1 Current Capacity of Water Treatment Plants in Danang City

Plants	Capacity (m^3/day)		Water Resources
	Design	Existing Situation	
1. Cau Do Water Supply Plant (Old)	50,000	Temporary halted	Cam Le River
2. Cau Do Water Supply Plant (New)	120,000	89,000	Cam Le River
3. Airport Water Supply Plant	30,000	35,000	Cam Le River
4. Son Tra Water Supply Plant	5,000	4,000	Son Tra Peninsula
Total	205,000	128,000	

Source: Danang City

(c) **Distribution Pipeline:** The network is composed of the following:

(i) 262 km of Class I pipeline (DN>200 mm);

(ii) 263 km of Class II pipeline (DN=100 mm–200 mm); and

(iii) 3,021 km of Class III pipeline (DN<100 mm), of which 951 km comprise service and branch pipelines.

(d) **Rural Water Supply:** DARD carried out a clean rural water program which provided access to 18% of the population to the well developed in the program.

Figure 8.3.2 Water Pipeline Network in Danang City

Source: DaCRISS Study Team

3) Institutions

8.12 The Department of Construction (DOC) of Danang City has jurisdiction over urban water development, with the DWSC as water supplier and the Department of Agriculture and Rural Development (DARD) responsible for rural water supply.

8.13 International partners have participated in the development of the water supply service in Danang. The World Bank, for instance, has supported water connection improvements in the three cities sanitation project, and the Netherlands started a project on administrative reform including customer relations. The participation from the private fund for DWSC was also planned.

4) Main Issues

(a) **Development Approaches:** Basically, two different approaches are needed in Danang City, i.e., to extend the centralized water supply system in the urban areas and to develop in suburban areas independent types of water supply facilities which use groundwater. The short-term goal in the development of the network is to expand the target area, while the long-term goal is to supply adequate water to 100% of the population.

(b) **Reduction in Water Loss:** The rate of water loss is relatively high. The DWSC already started installing water meters at major sections to monitor and control water loss. Pipe rehabilitation should follow this process.

(c) **Integrated Water Resource Management:** Even if water loss is improved, actual water demand will markedly increase because of the expansion of service area, population increase, and improvement in the quality of life. It seems impossible to cope with these changes based on current and planned water resource exploitation. Working with other water users, such as the agriculture sector, power sector, and river basin stakeholders, can be effective in managing water resources and finding other sources. Details of water resource management are described in section 3.17.

(d) **Groundwater Resources:** Tapping groundwater sources is fast becoming unfeasible because of contamination. However, it is still used in areas without a centralized supply system and it takes time to replace it with other sources. For the time being, support to improve the quality of groundwater is required.

(e) **Capacity Building for Operating Body:** The Netherlands has provided technical support to improve the operations of the DSWC including customer relations from 2007. To maximize limited financial resources, privatization can be considered.

8.4 Wastewater Treatment

1) Network and Facilities

8.14 Central Danang City has a combined sewerage system. Wastewater and rainfall are collected in trunk drains, at the end of which are chambers which separate wastewater and manage counter flow from the sea. Separated wastewater is pumped and transferred to wastewater treatment plants. The chambers and pumps are operated manually.

8.15 It is said that only 20% of the capacity of the treatment plants is being used because some houses have septic tanks which are not connected to the drainage system. In addition, the average level of biochemical oxygen demand (BOD) in wastewater is only 70 mg/l because most of the inflow is treated by septic tanks and combined with rainfall.

Table 8.4.1 Capacity of Wastewater Treatment Plants

Name	Capacity (m^3/day)
Hua Cuong	30,000
Ngu Hang Son	8,000
Phu Loc	8,000
Son Tra	12,000
Hoa Xuan	Planned in PIIP

Source: Danang City

8.16 After the development of the sewerage system, the subsidy for night soil collection was stopped even though the connection rate is still low. At the same time, only a limited amount of night soil from septic tanks is collected by night soil trucks operated by private companies. Treatment is done at night soil aerobic treatment facilities at the Khanh Son landfill site.

2) Drainage

8.17 The combined drainage system in Danang includes storm water drainage and sewerage systems. The drainage system is developed only in the city center due to the limited budget. Even then only the trunk lines were set up. In addition, the development of the drainage system in the emerging urban areas is completely delayed. Not only facilities, but also the land level for the area was not designed to prevent flooding.

3) Pollution Sources

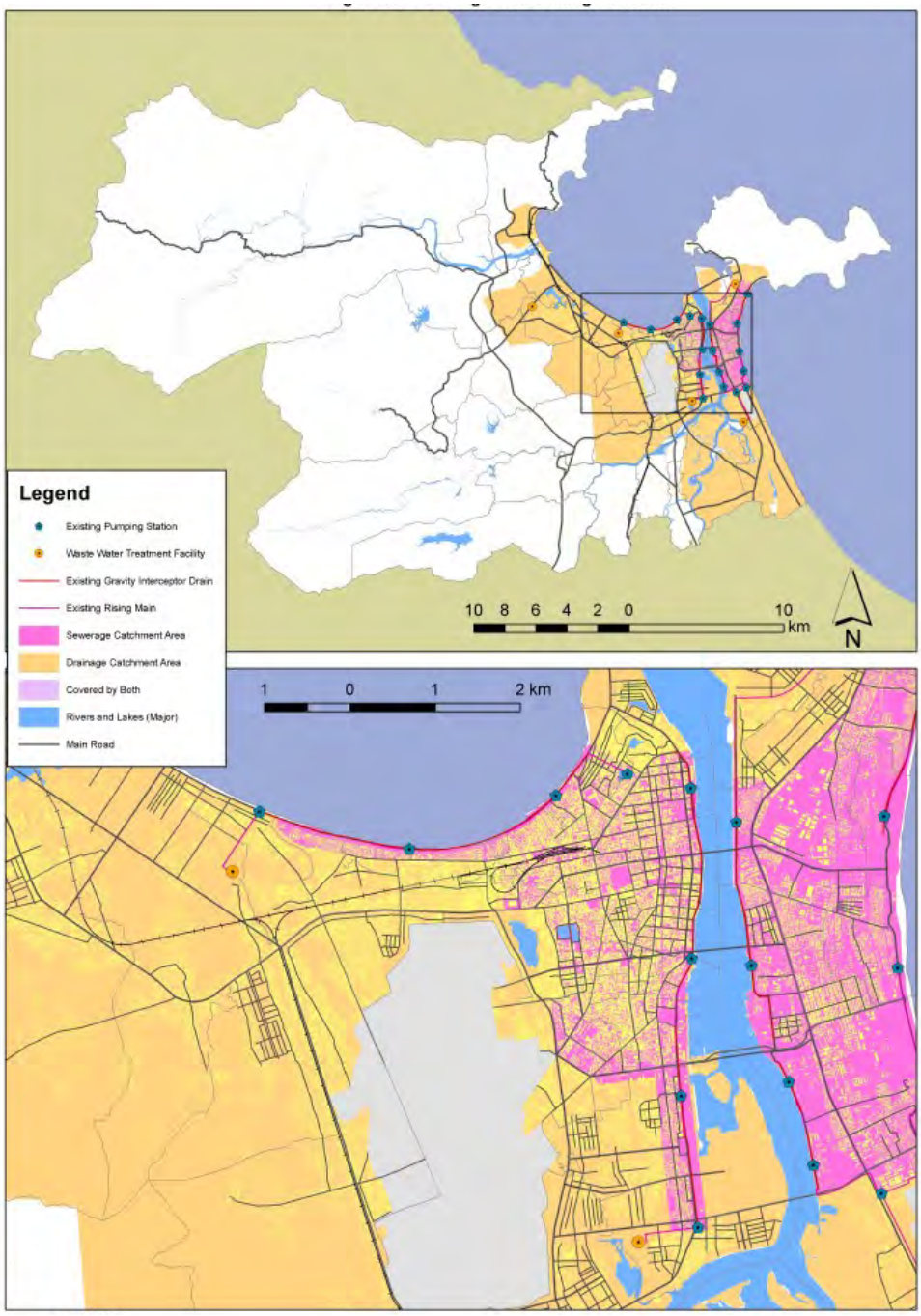
(a) **Domestic Wastewater:** Household Interview Survey (HIS) results showed that 53% of households are equipped with saturation-type septic tanks. Only effluent overflow is drained to the pipeline.

(b) **Wastewater from Hospitals:** Eleven (11) hospitals out of 21 have pre-treatment equipment; however, their conditions and status of operation are not known.

(c) **Industrial Wastewater:** Out of five industrial zones, only one has a wastewater treatment plant. There are reports of pollution and problems caused by effluents from some factories.

(d) **Hospital Wastewater:** It is reported that only a few hospitals have sufficient facilities to treat hazardous and polluted wastewater.

Figure 8.4.1 Drainage and Sewerage Network in Danang City



Source: DaCRISS Study Team

4) Institutions

8.18 The DOT has jurisdiction over drainage and wastewater treatment, while DONRE monitors water quality. Tariff is set to about 15% of water supply charge, which, however, is not enough to support the operation of wastewater treatment systems and monitoring. HIS results showed that the people's willingness to pay for this sector is relatively low compared with water supply. The World Bank is involved in developing this sector through the Danang Priority Infrastructure Investment Project (PIIP) which includes upgrading the existing three wastewater treatment plants in the city and formulating a wastewater treatment master plan.

5) Main Issues to Address

(a) **Wastewater Treatment Master Plan:** The PIIP formulated a wastewater treatment master plan in April 2009. Planning issues included the introduction of a separate sewerage system, formulation of a construction plan for a new treatment plant, demolition of existing septic tanks, and others.

(b) **Industrial Wastewater:** As described above, the World Bank supported efforts to improve domestic wastewater treatment. Standards for effluent from industrial wastewater were developed. However, DONRE has not enough capacity to enforce the standards in industries and companies. Moreover, there is no available international partner supporting DONRE. Measures on industrial wastewater treatment are urgent.

(c) **Harmonization with Water Supply Plan:** The development plan on wastewater should be coordinated with the water supply plan to, among others, prevent the discharge of effluents into open water sources without first undergoing treatment.

Picture 8.4.1 Wastewater Treatment

Hoa Khanh IZ Treatment Facility

Cam Le District Medical Center

Danang IZ Treatment Facility

Source: DaCRISS Study Team.

8.5 Solid Waste Management

1) Waste Generation

8.19 Based on the estimates of the Urban Environmental Company (URENCO), the domestic waste generated within Danang reaches 630 tons a day, 85% of which the company can collect. URENCO provides daily collection services in the city's central districts.

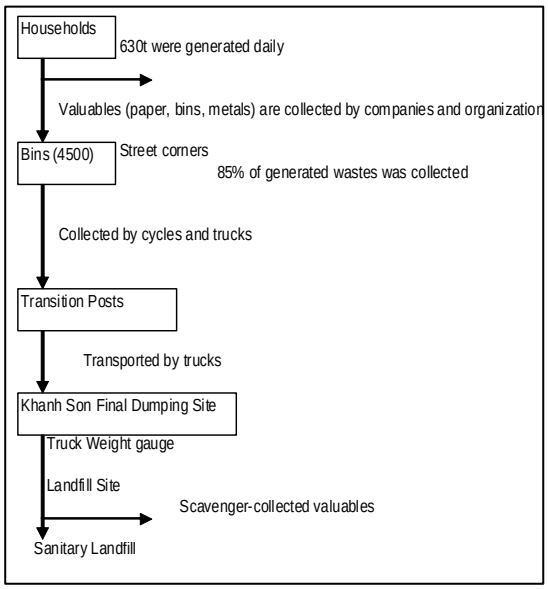
8.20 There are no reliable statistics on industrial waste, however. Some companies, including URENCO, contract other companies to collect and dump such waste into final disposal sites.

2) Waste Collection and Treatment

8.21 A system for domestic waste management was introduced in the "Three Cities Sanitation Project[1]" of the World Bank (see Figure 8.5.1). Source separation was, however, not introduced, although some community organizations and small-scale private companies collect recyclables. The treatment of leachate is also not sufficient enough to meet the standards for effluents.

8.22 There is no separate facility or equipment to treat industrial waste. Meanwhile, a new incinerator for hospital waste had just started operation at the Khanh Son landfill site. Industrial waste need to be given attention since it could cause serious environmental pollution. However, there was no available statistical data on the amount of generated industrial waste. According to World Bank data, industrial waste was about 40% of urban waste nationwide in 2004 which is 2,638 thousands ton a year. Based on this, the amount generated in Danang City was estimated to be more than 250 tons/day.

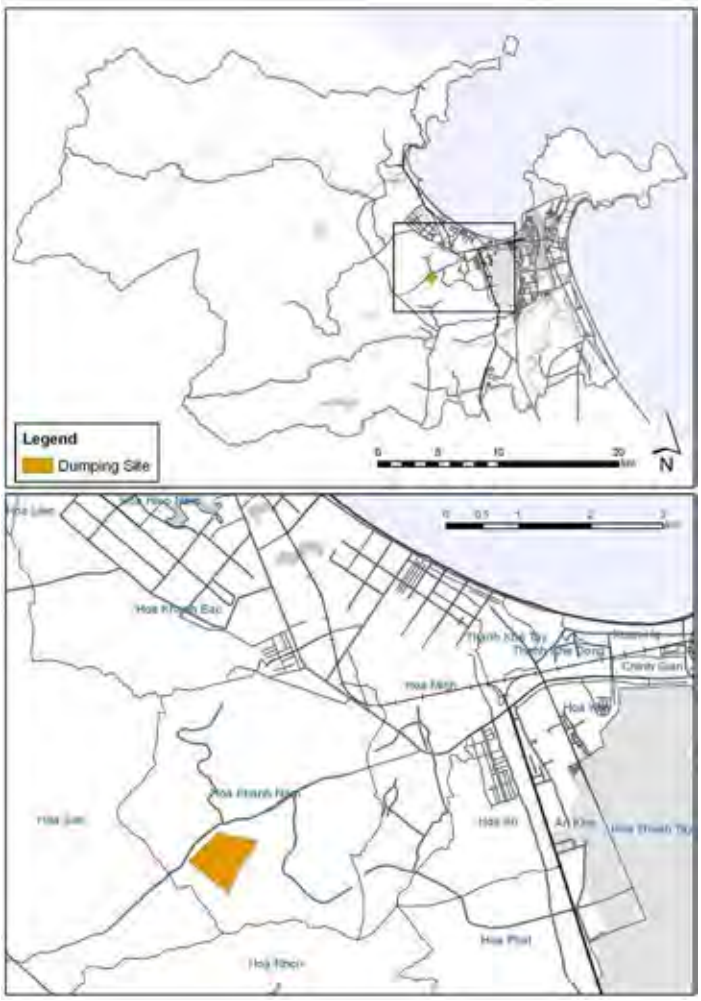
Figure 8.5.1 Solid Waste Treatment System



Source: DaCRISS Study Team.

[1] The Three Cities Sanitation Project for Vietnam aimed to: (i) sustain improvements to public health, and (ii) increase economic development by reducing the incidence of flooding, upgrading the urban environment, and developing more efficient and financially sustainable sanitation and drainage companies in Danang, Haiphong, and Quang Ninh province. The project complemented an IDA (International Development Association)-assisted water supply project covering the same cities. The project comprised similar subprojects in the areas mentioned and included components on sewerage and sewage treatment, drainage, institutional development and construction management, and revolving funds for household sanitation facilities. There was also a solid waste component for Danang and Quang Ninh. (Source: http://web.worldbank.org/external/projects/main?pagePK=64283627&piPK=73230&theSitePK=40941&menuPK=228424&Projectid=P051553)

Figure 8.5.2 Khan Son Landfill Site in Danang City



Source: DaCRISS Study Team

3) Institutions

8.23 DONRE has jurisdiction over domestic waste, while URENCO is the only entity which collects domestic waste. Some groups and individuals also collect valuable waste, while about 300 scavengers working the Khanh Son landfill for recyclables. The tariff for domestic waste collection is set and approved by the people's committee based on the distance of houses from and the width of the streets. DONRE also has jurisdiction over industrial waste; however, the enforcement is not authorized. Hospital wastes are managed by the Department of Health.

4) Main Issues to Address

(a) **Measures on Industrial and Hazardous Waste:** Since the data and information regarding the generation and disposal of industrial waste are not detailed enough, a survey shall be conducted.

(b) **Measures to Reduce Landfill Waste:** Due to population increase and improvement in the standard of living, waste composition is expected to change and the volume of landfill waste would increase. However, the landfill site cannot be expand and it is difficult to find a new one. Therefore, landfill waste has to be reduced. Introducing intermediate treatment methods combined with the 3 Rs (reduce, reuse, recycle) seems to be a feasible solution, among others.

Picture 8.5.1 Khanh Son Dumpsite

Dumped Waste

Anaerobic Lagoon

Night Soil Treatment

Source: DaCRISS Study Team.

Picture 8.5.1 Solid Waste Collection

Collection Center

Waste Bins for Collection

Collected Solid Waste

Source: DaCRISS Study Team.

8.6 People's Assessment of Urban Utilities and Services

8.24 Table 8.6.1 shows the access to water among households in Danang City. While inner core districts, such as Hai Chau and Thanh Khe, have a high connectivity rate to piped water services, other areas have much lower rates, with Hoa Vang having the lowest at only 6.6% of its households with access to water. This ratio is considerably low as the national average was 50% back in 2005. At the same time, Figure 8.6.1 shows that the willingness-to-pay for improved water services in Hoa Vang is also the lowest among the districts. This implies that the people in this district can access water by other means, such as wells, standpipes, surface and rainwater. However, a large proportion of people not connected to piped water in Ngu Hanh Son and Cam Le felt that the distance to water sources is a problem, while this ratio is lower in Hoa Vang. Most people felt that the most important aspect in water supply is improving its quality.

8.25 Table 8.6.2 shows the situation of sanitation in Danang City. Almost all residents have access to flushing toilets, much higher than the national average which is 41% in 2005. On the other hand, many people felt the necessity of providing more public toilets in parks and near water bodies, and along major roads. While a considerable number of households in Hai Chau and Son Tra have are connected to urban sewerage systems, most districts rely on on-site sanitation facilities, such as septic tanks, and collected by public service companies.

8.26 Table 8.6.3 shows the situation of drainage and flooding in Danang. The people's assessment of the drainage conditions is especially low in Lien Chieu and Hoa Vang. Looking into the water level and durations of the most serious flooding in the past, the situation seems to be especially acute for Ngu Hanh Son, Cam Le, and Hoa Vang. Nearly half of all respondents experienced floodwaters reaching up to the waist or even higher, and the flood lasting for more than one day.

8.27 Tables 8.6.4, 8.6.5, and 8.6.6 show the situation for solid waste. About 85.5% of all residents are covered by solid waste collection services. In Hoa Vang, since only 20% of the residents have such services, the average fee naturally becomes smaller than in other districts. However, one remarkable point is that the average fee for solid waste collection services is exceptionally high in Hai Chau, Thanh Khe, and Ngu Hanh Son.

8.28 Nearly 30% of all respondents separate their household waste, and most of these people sell or give away these wastes. Though this implies that the purpose of waste segregation is merely to earn money or to give to the poor, this practice suits Danang City's vision of becoming an Environmental City. Moreover, most inner-city households with no solid waste collection services throw their waste into nearby dump sites. In other districts, waste is treated in their own backyard. Although there is a slight concern about the methods used and their safety, it is reassuring to know that very few people throw their waste to nearby drainages or rivers or dispose of them on other peoples' land. Overall, it can be concluded that the behavior of the residents in Danang City fits the city's environmental aspirations.

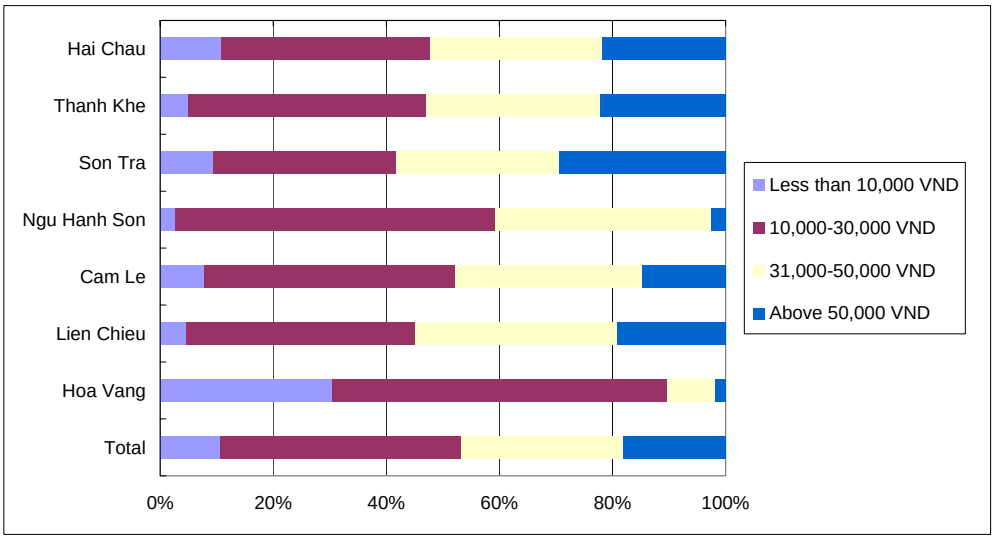
Table 8.6.1 Water Supply Conditions in Danang City

				Hai Chau	Thanh Khe	Son Tra	Ngu Hanh Son	Cam Le	Lien Chieu	Hoa Vang	Total
Households Connected to Piped Water	Connectivity (% of Yes)			94.4	86.6	84.1	45.9	37.8	55.6	6.6	67.1
	Satisfaction to Services (%)	Water Quality (%)	Dissatisfied	3.9	9.4	6.8	7.0	12.0	10.3	4.5	7.0
			So-so	35.3	28.2	33.2	27.8	25.3	31.2	25.0	31.7
			Satisfied	60.8	62.4	60.0	65.2	62.7	58.6	70.5	61.3
		Water Pressure (%)	Dissatisfied	9.0	4.8	6.5	7.0	5.1	11.3	6.8	7.3
			So-so	45.1	33.4	36.8	34.2	27.2	35.3	52.3	38.3
			Satisfied	45.9	61.9	56.7	58.9	67.7	53.4	40.9	54.5
		Price (%)	Dissatisfied	3.1	3.3	6.5	5.1	8.9	6.5	0.0	4.4
			So-so	44.9	34.9	37.4	26.6	39.2	38.7	36.4	39.0
			Satisfied	52.0	61.8	56.1	68.4	51.9	54.8	63.6	56.6
		Water Quantity (%)	Dissatisfied	2.6	2.7	3.6	5.7	4.4	6.2	9.1	3.4
			So-so	38.5	27.4	36.7	21.5	26.6	33.2	34.1	33.3
			Satisfied	59.0	70.0	59.7	72.8	69.0	60.6	56.8	63.3
		Hours of Supply (%)	Dissatisfied	5.1	4.5	3.9	6.3	5.1	11.6	6.8	5.4
			So-so	41.0	31.3	37.1	33.5	29.1	34.2	31.8	36.0
			Satisfied	53.8	64.2	58.9	60.1	65.8	54.1	61.4	58.6
Households Not Connected to Piped Water	Main Sources of Water (%)		Private well	92.8	96.4	85.0	97.8	84.6	98.7	84.8	89.5
			Public well	1.4	1.4	2.5	1.6	1.5	0.9	1.7	1.6
			Stand pipe	0.0	0.0	0.8	0.0	0.0	0.0	1.1	0.5
			Surface water	0.0	0.0	0.0	0.0	0.8	0.0	0.5	0.3
			Rain water	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.1
			Others	5.8	2.2	11.7	0.5	12.3	0.4	11.9	8.0
	Problems Regarding Water Supply (%)		Distance to water	34.0	37.7	55.3	72.4	72.3	38.0	54.4	55.5
			Water quality	34.0	18.0	19.1	5.9	10.9	32.5	20.5	19.2
			Water quantity	6.0	1.6	2.1	0.7	0.0	0.6	2.2	1.6
			Other	26.0	42.6	23.4	21.1	16.8	28.9	22.9	23.7
Important Aspect in Water Supply (%)			Water quality	75.7	64.1	67.3	75.0	75.5	68.9	68.6	70.4
			Water pressure	8.1	13.4	10.4	14.0	2.8	9.9	3.3	9.8
			Price	6.7	9.8	14.6	4.5	18.1	4.0	19.8	9.8
			Water quantity	4.7	7.3	3.9	3.5	1.2	11.2	5.8	5.5
			Hours of supply	4.9	5.4	3.8	3.0	2.4	5.9	2.5	4.6
Willingness-to-pay for Improved Services [VND/month] (%)			Less than 10,000 VND	10.8	4.9	9.4	2.6	7.9	4.6	30.4	10.6
			10,000 - 30,000 VND	37.0	42.1	32.3	56.7	44.3	40.6	59.2	42.7
			31,000 - 50,000 VND	30.3	30.7	29.0	38.1	33.0	35.6	8.7	28.6
			Above 50,000 VND	21.8	22.3	29.3	2.6	14.8	19.2	1.8	18.1
			Average [VND] 1)	39,733	39,976	43,307	29,099	34,175	38,733	18,218	36,085

Source: DaCRISS HIS, 2008.

[1] Average value was calculated using median values for each value range, assuming the respondents answering maximum and minimum ranges have the same trend as other ranges.

Figure 8.6.1 Monthly Fees Danang Households are Willing to Pay for Improved Water Services by District



Source: DaCRISS HIS, 2008.

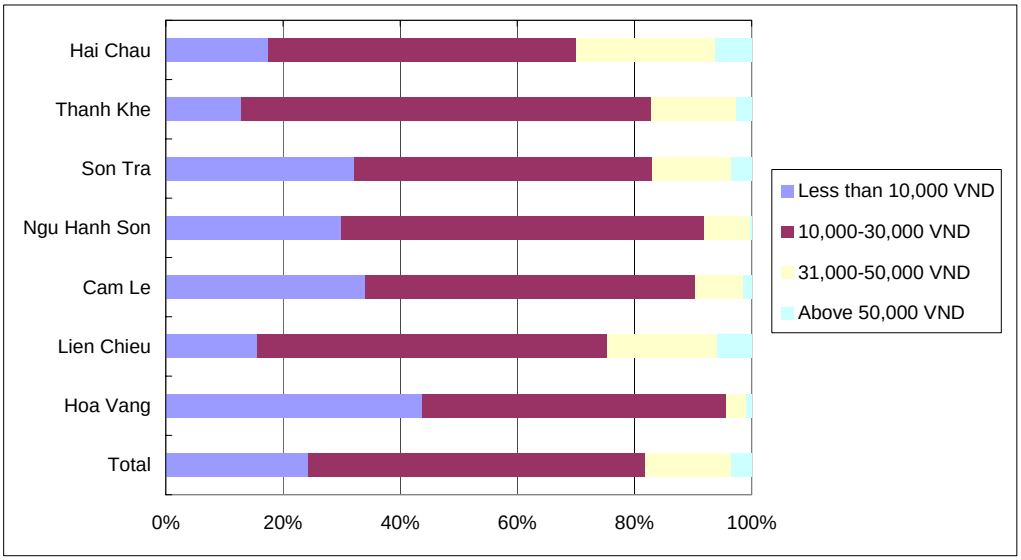
Table 8.6.2 Sanitary Conditions in Danang City

			Hai Chau	Thanh Khe	Son Tra	Ngu Hanh Son	Cam Le	Lien Chieu	Hoa Vang	Total
Toilet Facility (%)		Flushing toilet	99.4	98.4	91.9	97.4	90.4	96.6	85.9	95.0
		Suilabh toilet	0.2	1.2	7.7	1.5	3.8	1.9	1.8	2.3
		Simple toilet	0.2	0.3	0.4	0.3	4.5	0.4	4.0	1.1
		Shared toilet	0.1	0.1	0.0	0.0	0.5	0.0	0.6	0.2
		No toilet	0.2	0.0	0.0	0.9	0.7	1.1	7.8	1.3
Sanitation Treatement (%)		Connected to urban sewerage system	38.8	6.0	22.1	0.0	3.6	7.6	3.1	15.7
		On-site sanitation facility (eg septic tank) and collected by public service company	58.6	93.7	77.1	97.7	89.5	91.6	80.5	80.4
		No sanitation treatment	2.7	0.4	0.8	2.3	6.9	0.8	16.4	3.9
Assessment of Sanitary Conditions (%)		Bad	3.8	11.6	12.2	5.5	8.1	9.9	11.6	8.9
		So-so	39.4	28.1	32.7	30.5	39.5	55.0	59.7	39.9
		Good	56.8	60.2	55.1	64.0	52.4	35.0	28.7	51.3
Assessment of Sanitation	Offensive Odor (%)	Always	4.1	7.1	3.5	4.7	7.9	6.5	6.2	5.5
		Sometimes	19.3	20.9	36.8	17.4	24.9	39.0	42.5	27.8
		Never	76.6	72.0	59.8	77.9	67.2	54.5	51.3	66.6
	Clogged Pipe (%)	Always	0.6	2.8	0.9	0.3	2.2	3.0	0.4	1.5
		Sometimes	8.7	11.9	21.0	9.0	5.5	10.7	7.9	11.1
		Never	90.6	85.3	78.1	90.7	92.3	86.3	91.6	87.5
	Overflowing Wastewater (%)	Always	0.6	2.9	2.1	0.9	2.6	2.9	0.6	1.7
		Sometimes	4.5	9.6	22.0	6.1	7.2	14.1	8.8	10.1
		Never	94.9	87.5	75.8	93.0	90.2	83.0	90.6	88.1
Willingness-to-pay for Improved Services [VND/month] (%)		less than 10,000 VND	17.5	12.9	32.1	29.9	34.0	15.6	43.8	24.4
		10,000—30,000 VND	52.6	70.0	50.9	61.9	56.5	59.8	51.8	57.6
		31,000—50,000 VND	23.7	14.4	13.5	7.8	8.1	18.7	3.4	14.5
		above 50,000 VND	6.2	2.7	3.5	0.3	1.4	5.9	1.0	3.5
		Average [VND/month] 1)	26,517	22,577	19,987	17,238	17,440	25,305	14,736	21,581
Providing More Public Toilets	Necessity (%)	Yes	82.1	73.4	95.1	93.0	85.2	80.4	83.9	83.3
		No	17.9	26.6	4.9	7.0	14.8	19.6	16.1	16.7
	Location (%)	Parks and Water Bodies	42.0	39.8	53.4	18.1	35.4	48.5	33.2	40.6
		Major roads	53.0	59.0	40.8	81.9	59.0	50.8	66.1	56.3
		Others	5.0	1.2	5.9	0.0	5.6	0.7	0.7	3.1
	Fee [VND] (%)	Less than 1,000	44.1	35.8	27.0	29.4	34.3	38.1	42.3	36.8
		1,000—2,000	44.5	55.4	56.1	59.7	41.0	58.2	40.4	50.2
		Over 2,000	1.5	1.7	1.5	0.0	1.7	0.9	1.0	1.3
		Free	9.9	7.1	15.4	10.9	23.0	2.8	16.3	11.7
		Average [VND] 1)	926	1,052	1,015	1,042	829	1,086	844	970

Source: DaCRISS HIS, 2008

[1] Average value is calculated using median values for each value range, assuming the respondents answering maximum and minimum ranges have the same trend as other ranges.

Figure 8.6.2 Fees Danang Households are Willing to Pay for Improved Sanitation Services by District



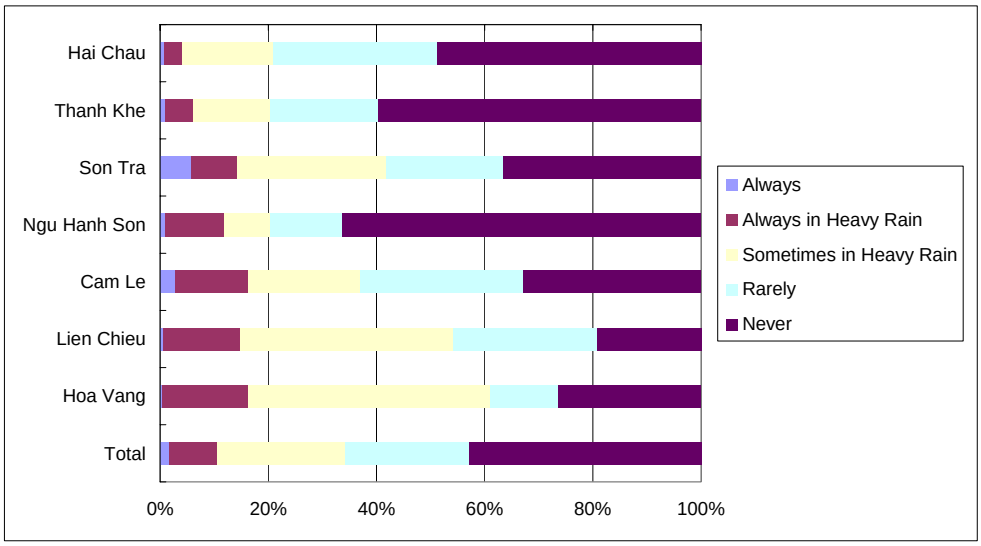
Source: DaCRISS HIS, 2008.

Table 8.6.3 Drainage and Flooding Conditions in Danang City

				Hai Chau	Thanh Khe	Son Tra	Ngu Hanh Son	Cam Le	Lien Chieu	Hoa Vang	Total
Assessment of Drainage Conditions (%)			Bad	6.6	10.7	21.4	14.0	21.8	25.9	31.4	16.9
			So-so	33.3	25.8	25.2	21.5	25.6	37.0	40.4	30.4
			Good	60.0	63.5	53.4	64.5	52.6	37.1	28.2	52.7
Flooding	Flooding up to Ankles in Neighborhood (%)		All the time, even not in heavy rain	0.7	1.0	5.8	0.9	2.9	0.6	0.3	1.7
			Always when it rains heavily	3.5	5.2	8.4	11.0	13.4	14.3	16.1	8.8
			Sometimes when it rains heavily	16.8	14.3	27.6	8.4	20.8	39.4	44.6	23.9
			Rarely	30.1	19.9	21.6	13.4	30.1	26.5	12.7	22.8
			Never	48.8	59.7	36.5	66.3	32.8	19.2	26.3	42.9
	Normal Flooding	Water Level (%)	Up to ankles	96.4	96.4	98.3	95.0	93.7	99.2	91.6	95.9
			Up to knees	2.8	3.6	1.7	5.0	5.2	0.8	6.2	3.4
			Up to waist and higher	0.8	0.0	0.0	0.0	1.1	0.0	2.1	0.7
		Duration (%)	Less than half a day	97.1	98.0	81.4	87.0	87.4	95.7	82.8	90.2
			Half day to 1 day	2.5	1.6	4.8	10.0	9.3	4.3	12.7	6.0
			More than 1 day	0.4	0.3	13.8	3.0	3.3	0.0	4.5	3.8
	Most Serious Flooding in 3 Years	Water Level (%)	Up to ankles	59.3	71.3	48.2	36.1	40.0	78.1	17.5	51.2
			Up to knees	34.5	24.9	50.3	30.6	26.0	20.7	44.2	34.2
			Up to waist and higher	6.2	3.8	1.6	33.3	34.0	1.2	38.3	14.6
		Duration (%)	Less than half a day	66.6	84.2	50.1	32.4	44.2	60.2	19.3	52.6
			Half day to 1 day	16.3	14.1	23.1	19.4	16.2	37.3	44.8	26.0
			More than 1 day	17.1	1.8	26.8	48.1	39.6	2.5	35.8	21.4
	Most Serious Flooding in the Past	Water Level (%)	Up to ankles	60.3	59.0	46.6	39.3	38.8	71.0	10.4	47.5
			Up to knees	31.4	34.9	35.7	17.9	21.3	27.1	28.9	29.9
			Up to waist and higher	8.3	6.0	17.7	42.9	39.9	2.0	60.6	22.6
		Duration (%)	Less than half a day	66.7	76.4	48.0	34.8	41.0	54.8	12.4	49.7
			Half day to 1 day	14.3	19.1	21.6	8.9	11.2	29.1	29.7	20.6
			More than 1 day	19.0	4.5	30.5	56.3	47.8	16.1	57.8	29.7

Source: DaCRISS HIS, 2008.

Figure 8.6.3 Ankle-high Flooding Incidents in Danang City



Source: DaCRISS HIS, 2008.

Table 8.6.4 Solid Waste Conditions in Danang City

			Hai Chau	Thanh Khe	Son Tra	Ngu Hanh Son	Cam Le	Lien Chieu	Hoa Vang	Total
Provision of Service (% of Yes)			98.4	96.2	99.5	86.9	88.0	96.2	20.0	85.5
Type of Service Provided (%)		Public	100.0	98.8	100.0	100.0	99.7	99.4	100.0	99.6
		Private	3.7	0.7	3.3	0.0	0.3	0.2	8.1	2.1
		Community	3.7	1.7	1.2	0.0	3.0	0.8	7.4	2.2
Public	Frequency (%)	Never	0.0	1.2	0.0	0.0	0.3	0.6	0.0	0.4
		Daily	99.3	91.4	96.4	55.2	70.1	87.5	11.0	87.1
		2-4 days a week	0.6	7.4	3.6	43.8	27.7	11.9	88.2	12.2
		Once a week	0.2	0.0	0.0	1.0	1.9	0.0	0.7	0.3
	Average Fee (VND/month/HH)		76,836	43,288	7,217	141,596	3,245	6,177	954	39,902
Private	Frequency (%)	Never	96.3	99.3	96.7	100.0	99.7	99.8	91.9	97.9
		Daily	0.0	0.2	2.7	0.0	0.0	0.0	7.4	0.7
		2-4 days a week	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.0
		Once a week	3.7	0.5	0.7	0.0	0.3	0.0	0.0	1.3
	Average Fee (VND/month/HH)		0	10	0	0	0	0	0	1
Community	Frequency (%)	Never	96.3	98.3	98.8	100.0	97.0	99.2	92.6	97.8
		Daily	0.0	1.2	0.5	0.0	2.2	0.6	6.6	0.8
		2-4 days a week	0.0	0.0	0.0	0.0	0.5	0.2	0.7	0.1
		Once a week	3.7	0.5	0.7	0.0	0.3	0.0	0.0	1.3
	Average Fee (VND/month/HH)		0	165	0	0	0	0	0	24
Separation of Organic Waste and Other Waste (% of Yes)			15.1	16.9	40.2	1.5	52.6	16.8	40.6	25.1
Storage	Organic Waste (%)	Waste basket/container	43.9	29.8	49.9	25.9	50.2	42.9	31.3	39.3
		Waste basket with plastic bag	42.2	41.5	25.1	28.2	14.6	22.7	22.8	31.5
		Plastic bag only	12.9	27.9	15.3	42.4	29.2	33.1	36.4	25.1
		In different bags/ baskets	0.6	0.7	9.7	2.6	1.9	0.8	8.6	3.3
		Other	0.5	0.2	0.0	0.9	4.1	0.6	0.9	0.7
		Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Other Waste (%)	Waste basket/container	40.0	30.0	48.1	24.4	21.8	43.2	33.5	36.0
		Waste basket with plastic bag	41.7	41.4	24.2	27.9	25.4	22.3	17.3	31.3
		Plastic bag only	17.6	27.6	16.3	44.2	48.6	33.1	44.6	29.2
		In different bags/ baskets	0.6	0.9	10.6	2.6	2.2	1.0	3.2	2.8
		Other	0.1	0.2	0.8	0.9	2.2	0.4	1.5	0.7
		Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Disposal	Organic Waste (%)	Before 6	3.2	5.0	20.4	19.9	9.8	7.4	9.0	9.1
		6 - 9	29.8	36.7	29.1	55.5	20.5	31.4	10.3	30.6
		9 -12	14.3	23.0	23.8	7.2	19.1	25.8	18.0	19.3
		12-15	9.9	13.1	2.7	10.3	8.6	19.9	20.8	11.3
		15-18	7.6	10.6	9.0	3.4	15.2	4.8	27.5	10.3
		18-21	24.3	9.5	14.3	3.7	26.3	10.7	12.8	15.7
		After 21	11.0	2.0	0.7	0.0	0.5	0.0	1.8	3.6
		Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Other Waste (%)	Before 6	3.3	5.0	21.2	19.4	12.2	7.3	5.8	9.2
		6 - 9	29.7	38.9	40.0	54.9	38.8	31.7	8.8	34.6
		9 -12	15.0	23.9	17.7	7.8	21.6	25.4	17.1	18.8
		12-15	10.0	14.2	2.0	10.7	7.9	20.0	21.2	11.5
		15-18	6.9	7.6	5.7	3.4	7.2	5.0	28.9	8.2
		18-21	23.8	7.8	12.6	3.8	11.3	10.5	13.5	13.6
		After 21	11.3	2.6	0.8	0.0	1.0	0.0	4.7	4.2
		Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Way of Waste Disposal (%)		Give directly to garbage trucks or waste collectors	55.4	57.5	61.5	72.7	37.3	79.6	12.3	53.1
		Leave at designated places for collection	12.9	16.3	12.7	3.8	19.4	15.2	10.2	13.4
		Leave in the street (not in place designated for collection)	4.0	4.3	7.3	0.9	1.7	0.6	1.6	3.5
		Burn	3.6	0.5	1.1	0.0	3.3	0.0	1.0	1.6
		Other	24.0	21.3	17.4	22.7	38.3	4.6	74.9	28.5

Source: DaCRISS HIS, 2008.

Table 8.6.5 Solid Waste Segregation in Danang City

				Hai Chau	Thanh Khe	Son Tra	Ngu Hanh Son	Cam Le	Lien Chieu	Hoa Vang	Total
Separation	Separation of Household Waste (% of Yes)			26.5	21.2	20.8	2.3	55.3	13.1	57.6	28.1
	Sell or Give Away Separated Waste (% of Yes)			97.9	94.1	99.4	87.5	97.8	97.1	98.5	97.5
	Plastic	Sell or Give Away (%)	Sell	71.6	72.1	75.0	71.4	77.0	79.1	96.4	80.3
			Give away	26.9	27.4	25.0	28.6	20.8	19.4	3.6	18.8
			Don't separate this	1.6	0.5	0.0	0.0	2.2	1.5	0.0	0.9
			Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		Sell or Give Away to (%)	Household / individual who recycles	18.7	35.3	9.0	14.3	17.6	7.6	11.6	17.4
			Recycling company	0.6	2.4	1.3	0.0	2.7	0.0	0.3	1.2
			Garbage collector who sells to a company for recycling	79.0	56.5	82.7	57.1	68.3	90.9	88.1	77.4
			Other	1.6	5.8	7.1	28.6	11.3	1.5	0.0	4.1
			Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Can / Metal	Sell or Give Away (%)	Sell	71.3	71.6	74.4	71.4	76.1	80.6	95.9	79.9
			Give away	27.5	26.0	25.6	28.6	20.8	19.4	3.6	18.8
			Don't separate this	1.3	2.4	0.0	0.0	3.1	0.0	0.5	1.3
			Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		Sell or Give Away to (%)	Household / individual who recycles	17.4	36.5	9.6	14.3	17.8	7.5	11.7	17.3
			Recycling company	1.6	2.5	1.3	0.0	2.7	0.0	0.3	1.4
			Garbage collector who sells to a company for recycling	80.1	55.2	81.4	57.1	68.0	91.0	88.1	77.3
			Other	0.9	5.9	7.7	28.6	11.4	1.5	0.0	4.1
			Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Glass	Sell or Give Away (%)	Sell	67.5	66.8	71.8	71.4	74.8	79.1	95.9	77.7
			Give away	30.0	29.8	27.6	28.6	21.7	19.4	3.6	20.3
			Don't separate this	2.5	3.4	0.6	0.0	3.5	1.5	0.5	2.0
			Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		Sell or Give Away to (%)	Household / individual who recycles	17.6	35.3	8.4	14.3	17.4	7.6	11.7	17.0
			Recycling company	1.3	2.0	1.9	0.0	2.8	0.0	0.5	1.4
			Garbage collector who sells to a company for recycling	79.8	56.2	81.9	57.1	68.3	90.9	87.8	77.4
			Other	1.3	6.5	7.7	28.6	11.5	1.5	0.0	4.2
			Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Paper / Cardboard	Sell or Give Away (%)	Sell	70.9	68.3	76.9	57.1	75.7	80.6	96.4	79.6
			Give away	28.4	28.8	22.4	28.6	21.7	19.4	3.6	19.2
			Don't separate this	0.6	2.9	0.6	14.3	2.7	0.0	0.0	1.2
			Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		Sell or Give Away to (%)	Household / individual who recycles	17.3	36.1	9.7	16.7	16.8	7.5	11.6	17.0
			Recycling company	0.6	2.0	1.3	0.0	2.7	0.0	0.3	1.1
			Garbage collector who sells to a company for recycling	80.8	55.9	81.3	50.0	69.5	91.0	88.1	77.8
			Other	1.3	5.9	7.7	33.3	10.9	1.5	0.0	4.1
			Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: DaCRISS HIS, 2008.

Table 8.6.6 Satisfaction with Solid Waste Services among Households in Danang City

				Hai Chau	Thanh Khe	Son Tra	Ngu Hanh Son	Cam Le	Lien Chieu	Hoa Vang	Total
Separation	Electronic Waste	Sell or Give Away (%)	Sell	72.8	71.0	77.6	57.1	74.8	74.6	95.6	79.9
			Give away	25.9	24.2	21.8	28.6	21.2	19.4	3.6	17.8
			Don't separate this	1.3	4.8	0.6	14.3	4.0	6.0	0.8	2.3
			Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		Sell or Give Away to (%)	Household / individual who recycles	17.7	41.2	9.0	16.7	17.1	6.3	11.7	17.8
			Recycling company	1.3	1.5	1.9	0.0	2.8	0.0	0.3	1.3
			Garbage collector who sells to a company for recycling	79.4	51.8	81.3	50.0	68.7	92.1	88.1	76.7
			Other	1.6	5.5	7.7	33.3	11.5	1.6	0.0	4.2
			Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Other	Sell or Give Away (%)	Sell	60.9	43.8	52.8	0.0	60.0	42.9	95.1	65.7
			Give away	39.1	37.5	38.9	100.0	10.0	42.9	2.4	26.1
			Don't separate this	0.0	18.8	8.3	0.0	30.0	14.3	2.4	8.2
			Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		Sell or Give Away to (%)	Household / individual who recycles	26.1	7.7	18.2	0.0	42.9	16.7	25.6	22.1
			Recycling company	0.0	15.4	0.0	0.0	14.3	0.0	0.0	2.5
			Garbage collector who sells to a company for recycling	73.9	69.2	57.6	100.0	28.6	66.7	74.4	66.4
			Other	0.0	7.7	24.2	0.0	14.3	16.7	0.0	9.0
			Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Earning from Selling Waste (VND / month)			15,081	10,360	6,418	22,000	9,751	113,315	8,281	15,119
Satisfaction with Current Service	Frequency of Collection (%)		Highly	0.6	0.1	0.4	0.7	1.1	1.6	1.5	0.6
			Dissatisfied	4.1	1.7	5.2	5.7	6.0	3.6	6.7	4.0
			So-so	48.2	35.2	32.8	23.7	29.9	25.3	53.3	36.6
			Satisfied	46.6	59.3	56.9	63.2	48.1	68.1	38.5	55.0
			Highly satisfied	0.5	3.7	4.7	6.7	14.9	1.4	0.0	3.7
	Method of Collection (%)		Highly	0.6	0.2	0.5	0.7	1.1	3.8	1.5	0.9
			Dissatisfied	3.8	2.4	5.1	3.7	7.1	7.5	3.0	4.4
			So-so	49.9	35.8	32.8	22.1	34.2	25.0	44.4	37.2
			Satisfied	45.3	57.3	56.5	64.2	46.5	61.4	51.1	53.6
			Highly satisfied	0.4	4.3	5.1	9.4	11.1	2.4	0.0	3.9
	Fee (%)		Highly	0.2	0.2	0.5	0.7	1.4	1.0	0.0	0.5
			Dissatisfied	2.5	2.7	4.9	2.3	10.6	4.0	3.0	3.9
			So-so	47.9	33.6	36.0	19.7	35.9	34.1	48.1	37.8
			Satisfied	48.0	60.6	53.4	67.9	44.3	52.5	48.9	53.5
			Highly satisfied	1.3	2.9	5.1	9.4	7.9	8.5	0.0	4.3
	Cleanliness (%)		Highly	0.5	3.9	0.9	1.0	1.4	3.8	1.5	1.9
			Dissatisfied	5.8	6.1	10.8	4.7	5.7	10.1	8.1	7.2
			So-so	52.0	40.7	32.0	24.7	41.0	31.3	46.7	40.4
			Satisfied	39.9	47.9	51.9	60.2	41.3	52.5	43.7	47.0
			Highly satisfied	1.9	1.5	4.3	9.4	10.6	2.4	0.0	3.5
Disposal of Solid Waste for HH with no Service (%)			Treated in own land	10.0	22.5	0.0	77.8	58.0	50.0	86.8	77.1
			Throw to nearby dump sites	80.0	77.5	75.0	13.3	22.0	40.0	10.6	18.3
			Throw into nearby drainage	5.0	0.0	0.0	0.0	2.0	10.0	0.0	0.6
			Dispose of on others' land	5.0	0.0	25.0	8.9	18.0	0.0	2.6	4.0
Willingness-to-pay for Improved Services [VND/month] (%)			Less than 10,000 VND	24.3	25.6	39.3	40.7	40.9	21.1	67.7	34.9
			10,000—30,000 VND	62.9	66.6	56.0	54.4	56.5	62.9	32.0	57.3
			31,000—50,000 VND	12.1	7.2	3.9	4.4	2.4	14.7	0.3	7.2
			Above 50,000 VND	0.7	0.7	0.8	0.6	0.2	1.3	0.0	0.6
			Average [VND/month] 1)	19,308	17,978	15,312	15,087	14,474	20,495	9,905	16,574

Source: DaCRISS HIS, 2008.

9 HOUSING

9.1 Overview

9.1 The current housing conditions in Danang City are as follows:

(i) Danang has relatively good housing conditions as compared with other cities in the country. In 2004, the average space per capita was 20.9 m^2, while the average housing floor area per household was about 95 m^2;

(ii) Available data and information on public housing in the city indicate that it comprises old public housing, which are houses or buildings constructed before 1975, and 14 apartment blocks of about 1,991 new public housing units developed in 2000–2005. Survey results indicated that 44% of households living in these here were dissatisfied with their living conditions;

(iii) Several of the city government's housing initiatives have further accelerated housing development in Danang. These include resettlement housing development as a consequence of the many urban development projects in accordance with the City Master Plan and the WB-funded Priority Infrastructure Investment Project (PIIP). In addition, the city's "three availabilities" program, which sees to it that jobs, housing, and an urbane lifestyle are available to every Danang resident, further emphasizes the city government's determination in making housing available to every citizen. This program is integrated in the five-year housing proposal;

(iv) However, after five years of accelerated public housing development (2000–2005) and one year of the promulgation of the housing proposal, the Danang City government is now experiencing fund shortage;

(v) Based on DaCRISS HIS results, more than 80% of Danang residents are satisfied with their present living conditions, with most regarding detached houses as the desired type of housing; and

(vi) Nearly 90% of the DaCRISS HIS respondents did not borrow money for house purchases, and 85% of the respondents said they do not intend to do so even if loans are available. However, those who borrowed money for house purchase did so mainly from both banks/financial institutions and relatives/friends. Around 30% of the respondents' property was used as collateral for house purchases.

9.2 The housing concerns being faced by the city are as follows: establishment of a housing development fund, provision of tax policies, mobilization of capital for renting state-owned properties and money for supportive groups and individuals. The tasks of various government agencies in affordable housing provision should be delineated among the DOC as lead agency and DOF, DPI, DOLISA, and DONRE as supporting agencies.

9.2 Housing Development

1) Housing Stock

9.3 Danang, one of the big Class I cities in Vietnam, has relatively good housing conditions in terms of average space per capita as compared with other cities in the country. In recent years, the expansion of housing stock has been increasing very fast. According to the General Statistics Office, the average housing floor area per capita in Danang in 2004 was 20.9 m^2 while the average housing floor area per household was about 95 m^2, which is a far departure from the 2002 figures of 18.4 m^2 and 81.2 m^2, respectively. Table 9.2.1 shows the housing standards of Vietnam and its cities in terms of average floor area per capita. It shows that the people in Danang have much bigger housing space compared with the residents in Hanoi or HCM city and the whole country.

Table 9.2.1 Average Per Capita Housing Floor Area in Vietnamese Cities, 2002 and 2005

Item	Danang		Vietnam	Hanoi	HCM City
	2005	2002	2002	2002	2002
Average housing floor area per capita (m^2)	20.9	18.4	12.5	14.27	16.05

Source: Assessment of Housing for Low Income Groups in Danang (LIHAS), 2005

9.4 Based on interviews made with senior officers of DONRE by the DaCRISS Study Team, the data in 2003 indicate that Danang had 123,287 housing units with a total floor area of 6.9 million m^2. Of this figure, 71,631 units (58%) were privately owned and accounted for 5.4 million m^2 floor area, while 51,656 units (42%) were publicly owned and shared 1.4 million m^2 floor area.

9.5 DONRE estimated that about 65% of the total housing stock has permanent structures, 30% are of semi-permanent, and the rest (5%) are of temporary structure. Table 9.2.2 shows the housing conditions of low-income groups in Danang in 2004. The number of temporary housing has decreased a lot in recent years, from 18.67% to 5%, after the administrative separation of Danang from the Quang Nam–Danang region in 1997 and also due to the city's beautification program which cleared the areas along the Han River and the beach from temporary houses. However, Danang often experiences natural calamities, such as typhoons, and damages from such have further added to the amount of housing units that need immediate improvement.

Table 9.2.2 Housing Conditions of Low-income Groups in Danang, 2004

District/	Number of Units and Condition					
	Permanent	Semi-Permanent	Temporary			No Home
			Condition 1	Condition 2	Condition 3	
1. Hai Chau	437	1.882	304	110	3	768
2. Thanh Khe	244	2.598	255	125	33	415
4. Son Tra	345	2.418	339	235	18	518
5. Ngu Hanh Son	200	1.808	129	78	11	80
6. Lien Chieu	338	2.194	229	102	6	119
7. Hoa Vang	474	3.417	909	900	85	1.115
Total	2.038	14.317	2.165	1.550	156	3.015
	23,241 units					

Source:LIHAS, 2007.

2) Housing Development Initiatives

9.6 During the early half of this decade, a considerable volume of new public housing

units were developed in Danang to address the resettlement requirement of many urban development and beautification projects in the city. To widen the scope of housing development beyond resettlement housing provision, the Danang City government launched the "Housing Development Proposal 2005–2010." This is one of the "three availabilities" program committed by the city government: housing availability, job availability, and urbane lifestyle availability." The housing proposal has goals and an action plan to ensure that every household in Danang owns a house. The main content of the Danang housing development proposal is to set housing development goals in the next five years from 2005 to 2010. The target housing beneficiaries of the program are from low-, middle- to high-income households and special groups. It aims to develop dormitories for students and public guesthouses, among others, as well as general solutions to meet the goals. The program also aims to get people used to living in mid- or high-rise apartment buildings to save land for future developments.

9.7 The housing proposal for the period 2005 to 2010 provides for the construction of 25,721 housing units, equivalent to 1,154,000m^2 floor area, to meet the demand generated by a wide range of potential beneficiaries including the poor and officially designated priority households, households affected by resettlement, low-income public servants, industrial workers, students and pupils, and special-category government officials and guests (see Table 9.2.3). The total estimated cost of the proposal is approximately VND1.7 billion. This figure includes VND1 billion for clearance, compensation, and resettlement.

Table 9.2.3 Danang DOC Housing Development Proposal 2005–2010

Potential Beneficiary		Dwelling Type/Area	No. of Housing Units	Remark
Poor & Priority HHs	Urban Poor & Priority HH	New 5–storey apartment (50m^2/unit)	2,621	Approx. 1,414 apartment units built by October 2005. But not clear how many of these were allocated to, and taken up by, urban poor/ priority HHs or those scheduled for resettlement.
	Rural Poor & Priority HH	Serviced plot+ 1–storey house (40m^2)	2,100	No indication available of provision to date.
	Subtotal		4,721	All urban and rural estimates need to be reconciled with DOLISA estimates of urban poor/priority HHs in June 2006.
Others	Resettlement	New 5– or 7–storey apartment (50m^2/unit)	6,000	Represents only approximately 10% of total estimated resettlement requirement to 2010. Comprises those HHs unable to purchase standard resettlement units.
	Public Servants	New 5–storey apartments (50m^2/unit)	570	Represents only 50% of the housing needs of all public servants to 2010. Made up of lower paid public servants, but not clear at this stage whether they fall within the LIH definition and thus within LIHAS scope.
		Serviced plot+ terrace(row) house (100–120 m^2/unit)	930	
	Industrial Workers	New dormitory type apartment (30–40 m^2/unit)	7,000	Accommodation for 70,000 workers @ 10 workers per unit with shared bathroom/ kitchen facilities. Responsibility of private sector / investors, but for present purposes included in LIHAS scope.
	Students & Pupils	New dormitory-type apartment (30–40 m^2/unit)	6,000	Accommodation for 60,000 students & pupils @ 10 students per unit. Responsibility of DOE/university. Not included in LIHAS scope.
	Public Guests	Detached house/ villas (150–200 m^2/unit)	50	Not included in LIHAS scope.
	Subtotal			

Total		25,271	

Source: DOC

3) Poor and Priority Households

9.8 The DOC housing program was not designed to meet all of Danang's housing needs, but only that portion of total housing need which is commensurate with the city's available financial resources and its budgetary priorities during the period. In this regard, it is important to note that the Department of Labor, War Invalids and Social Affairs (DOLISA) survey in 2005 estimated that there were more than 23,000 poor households in Danang (see Table 9.2.4). It is reasonable to assume that as early as 2005, before the devastating impact of Typhoon Xangsane, most, if not all, of these households had some form of housing need. However, the DOC Housing Program only provided for 4,721 housing units targeted for the poor (and priority) households, a figure equivalent to about 20% of the city's poor.

9.9 For the purpose of preparing its housing program, the DOC reportedly based its definition of poor households on the DOLISA poverty threshold (i.e., persons receiving <VND300,000/ month). However, if the definition of low-income households (LIH) adopted in the World Bank-funded "Assessment of Housing for Low Income Groups in Danang" (hereinafter referred to as the Low Income Housing Assessment Study or LIHAS) is used, low-income housing needs would be well in excess of the DOC housing program provision; LIHAS assumed a low-income household as those above the poverty line threshold, up to the average level of income, i.e. from 20th up to the 70th income percentiles.

Table 9.2.4 DOLISA Estimates of Poor Households and Population in Danang City

Item		Urban	Rural	Total
Poor HHs	Number	16,341	6,900	23,241
	% to Total	13.7	20.5	15.2
Poor Population	Number	76,188	28,716	104,904
	% to Total	12.9	19.8	14.8

Source: DOLISA Survey, 2005.
Note: Urban Poor <VND 300,000/person/month: Rural Poor: <VND 200,000/person/month

9.10 By October 2005, the DOC estimated that a total of 25 new apartment blocks comprising 1,414 units were either completed or under construction (see Table 9.2.5). However, there was no information available on the manner in which these apartment units were allocated to the wide range of housing needs included in the Housing Proposal, that is, what proportion of these completed units were occupied by identified poor (or priority) households or households scheduled for resettlement. Anecdotal evidence gathered in the course of a LIHAS field visit indicated that in at least one instance, the occupation of completed apartment units was delayed due to the inability of selected beneficiaries to afford the proposed rental and/or purchase price because of an overrun on the estimated construction cost.

Table 9.2.5 Construction Progress of Standard DOC Apartment Units[1] in Danang City

Status	No. of Apartment Blocks	No. of Units
Completed (in Use)	8	405
Completed (Not in Use)	10	579
Under Construction	7	430
Total (Completed, Not in Use, Under Construction)	25	1,414

Source: DOC

[1] As of October 2005.

4) Housing Support Policies

9.11 In June 2006, DOLISA estimated that a total of 2,931 LIHs and priority households, as well as a further 2,032 households in both urban and rural areas of the city, were living in temporary housing. No definition of temporary housing was provided, however. Through collaboration with the DOC, it was determined that these households would be provided for through a series of housing initiatives involving either the renovation and repair of existing houses, the construction of new houses, or (in the case of urban households) resettlement to either new apartments or serviced plots and houses. It is unclear at present just how this estimate relates to the DOC Housing Proposal.

(1) Financial Resource Mobilization

9.12 In the proposal, it is stated in very general terms that a housing development fund is to be established for housing development and to support those who have difficulties in accommodation or the low-income groups through loans. It also stated that incentives would be given for the participation of all sectors, investors, enterprises, banks, and communities in housing provision; yet it is not clear what kind of incentives are already in place. Other measures given in the proposal include the following:

(i) Provide policies on property taxes, institutional framework, and management solutions to land or housing transactions to protect them from speculation;

(ii) Mobilize financial investment nationally and internationally. Encourage joint-venture capital, capital loans from credit banks or organizations, capital from advance payments made by the buyers, and other legal financial sources based on regulations;

(iii) Mobilize capital from selling or renting state-owned houses and money paid by housing developers for land; and

(iv) Mobilize money from supportive individuals or organizations.

(2) Implementation Mechanism

9.13 It is mentioned in the proposal that the DOC should take the lead in supervising the housing development proposal and in collaborating with different departments, agencies, and stakeholders to implement the proposal. The DOC is also tasked with monitoring, synthesizing, and reporting to the Danang PC every six months and dealing with anticipated difficulties during project implementation. The specific tasks of relevant agencies in the city government's housing program are as follows:

(a) **DOC:** Collaborate with related departments to finalize the detailed plan for Phase 1 and report to the Danang PC before 10/10/2005; help the Danang PC in organizing, leading, guiding, and managing the performance of the project; and, regularly report results to the Danang PC;

(b) **DPI:** Collaborate with the Department of Finance (DOF) and related departments in proposing a plan on how to allocate government funds for housing program by phases and propose to Government mechanisms and policies on how to mobilize private capital for housing investment;

(c) **DOF:** Collaborate with the DPI, city bank's branches, and credit banks on establishing housing development funds; propose mechanisms for capital mobilization and regulation to support loans for priority user groups; and plan on how to supplement Govern-

ment's capital for housing stock development;

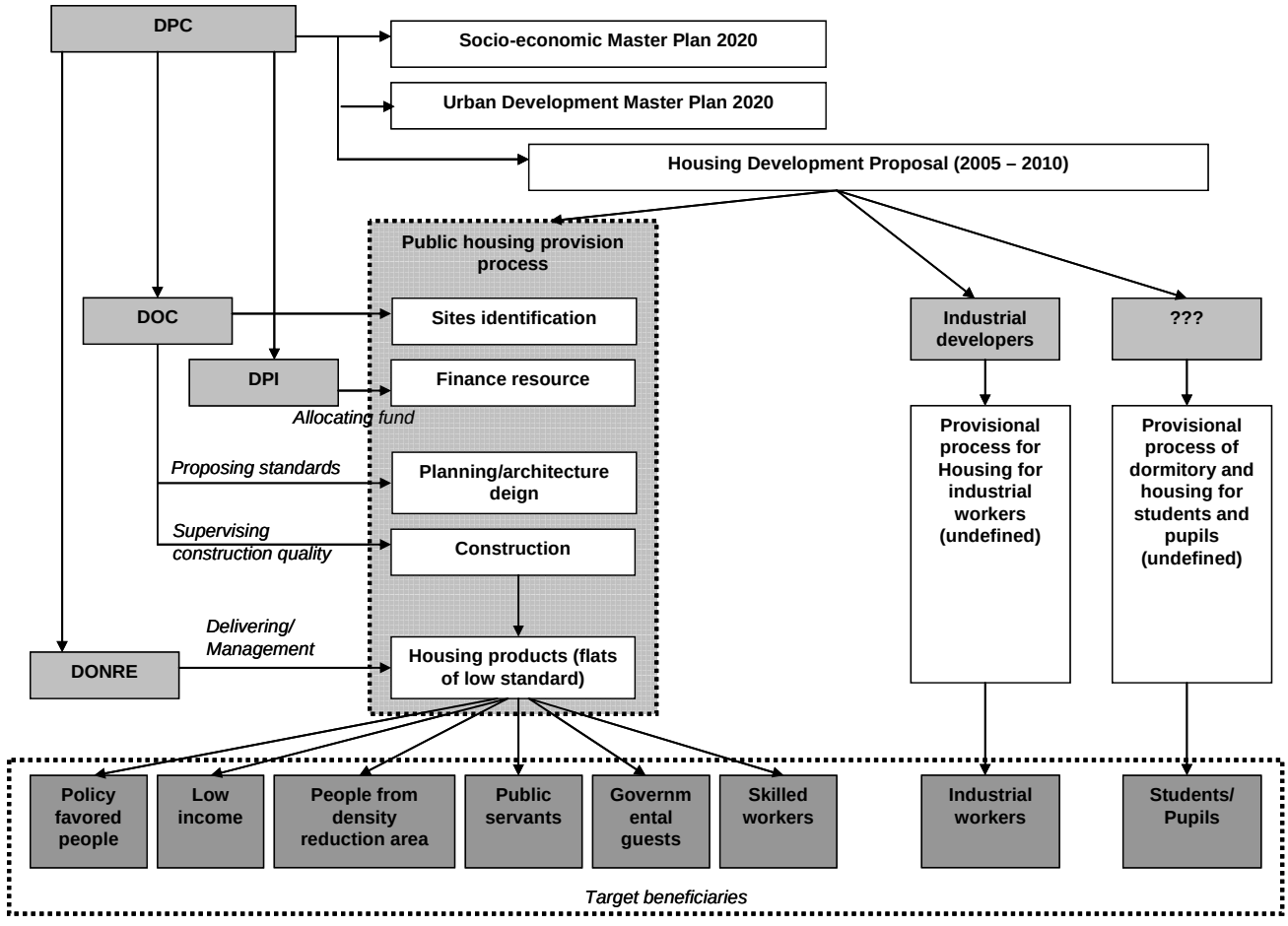
(d) **DOLISA:** Collaborate with district PCs in the survey, inventory, and classification of different subjects of housing based on regulated criteria; list and report to the Danang PC;

(e) **DONRE:** Collaborate with related departments to propose policies and mechanisms on land use, thereby facilitating the involvement of different economic sectors in investing and developing housing stock; report to Danang PC for approval; and

(f) **External Relations Office:** Search for and receive investments from foreign government organizations or nongovernment organizations (NGOs) for contributions to the national housing development fund.

9.14 Other agencies, such as the Internal Relations Office, Department of Industry (DOI), industrial zone management boards, district PCs, and others, need to collaborate with the DOC in identifying realistic housing needs of various social groups. Figure 9.2.1 shows the organization for the housing development proposal.

Figure 9.2.1 Organization for Danang's Housing Development Proposal 2005–2010



Source: Assessment of Housing for Low Income Groups in Danang, Vietnam, WB, 2006

5) Public Sector Housing

(1) Old Public Housing Stock (before 1975)

9.15 Unlike Hanoi, where majority of the old public housing is in the form of uniform apartment blocks in neighborhood units called *tieu khu* in Vietnamese and developed sys-

tematically by the State in the 1960s to the 1980s, in Danang, old public housing, or most of it, was not developed by the government but managed by it. They are houses or buildings constructed before 1975, taken over from the old regime, and distributed to public servants. These are basically low-rise buildings, from two to four storeys, with very poor utilities.. They used to be private houses, hotels, or buildings which functioned other than for mass housing. Therefore, their conditions are unsuitable as collective housing, since residents have to share common toilets and service spaces. There are 22 such buildings in Danang which are at present seriously dilapidated.

9.16 Public housing stock is under the management of the Housing Management Company of DONRE. Like their counterparts in Hanoi and other cities in Vietnam, Danang's DONRE collects housing rental fees from the residents of these public housing units. However, only 35% of the collections are used for periodic maintenance of the buildings, which proved to be far from adequate. Therefore, most public housing units/buildings are in poor condition, with some already in seriously dilapidated state. In terms of actual use by residents, 203 households are not actually using their units: 99 have transferred to other units, 48 are leasing their units, 47 have allowed relatives or acquaintances to use them, and nine have left their units vacant. Danang's Housing Management Company (HMC) has proposed a policy to resettle households which are living in these 22 most dilapidated collective buildings to new resettlement sites. However, according to HMC, consensus on resettlement was obtained from the tenants of four buildings only.

(2) Public Apartment Blocks (1980–2005)

9.17 Information about public housing stock built during the period 1980 to 2000 is not available. During the time the LIHAS Study Team worked with DONRE and DOC, data on the total number of apartment blocks or houses that were built by the government in this period of time was not provided. This did not mean though that there was no public housing stock built during that period; instead, it indicated that the city government did not have detailed planning for developing this housing type at that time. In the same manner, there was no statistical data available on apartment blocks that were built by state companies or state offices for use of their employees from 1980 to 2000. From 2000 to 2005, 14 apartment blocks of about 1,991 new public housing units were developed in Danang. The demand for these units initially arose due to the Danang City government's beautification program, whereby the banks of the Han River and the Thanh Binh beachfront were cleared of temporary housing and slums and converted into public spaces and major landscaped promenades. The first aim of public housing construction was to provide resettlement housing for low-income households and members of families affected by this program.

9.18 These public blocks were built by SOEs or PMUs supervised by the DPC, DOC, and DONRE. Again, all of these buildings were built with government budget. The HMC (in DONRE) is responsible for managing this housing type. The allocation of housing units of this stock (14 apartment blocks) is not very clear. A large number of units in Thanh Khe Dong, Thanh Khe Tay, Man Thai, and Thuan Phuoc were allocated for resettled people. There are also groups of civil servants, policy-favored, poor people who were approved by the DPC which are target groups for housing provision. For example, the DPC developed new apartment blocks, such as the Vung Thung apartment block model A and B, and the high-quality Le Dinh Ly apartment block, both of which are for middle- and high-income government workers.

9.19 However, there are no clear criteria on how to allocate these new accommodation units among potential tenants. In Vung Thung model A, 80% of the tenants are civil servants and the rest are both resettled and poor people. This situation is also true for other apartment blocks such as Man Thai and Thuan Phuoc. Based on the HIS survey, in 90% of new public apartment blocks, 52% of households living in new apartments are resettled households.

(a) Tenure Conditions

9.20 According to results of the LIHAS HIS, in new apartment blocks, only 5% of households have "red book" certificates of housing ownership, 23.9% have temporary certificates, 55.3% have housing allocation or house hire contracts, and 6% do not have any legal documents of housing tenure.

(b) Housing Floor Area and Amenities

9.21 According to the LIHAS HIS, the average living area per household in this housing type is relatively low, about 3m^2 compared with 193 m^2/HH in low-income areas. The living area per person is only 8.25m^2, which is much lower than the average living area of 20–25 m^2/person in the whole Danang City. Therefore, 44% of households are dissatisfied with their living space even though they live in new apartment blocks.

9.22 It can be stated that many apartment blocks built during early 2000–2001 have lower design standards than the newly built housing blocks. For example, resettlement blocks as Thanh Khe Dong and Thanh Khe Tay (in Thanh Loc Dan area) built in 2001 have six units per floor and are three-storey high. Units have 30m^2 space and are occupied by families (fisherfolk) of up to eight members. Units have running water, kitchen, and individual toilets but are very narrow. Monthly rents vary from VND80,000 for a third floor unit, VND100,000 for a second floor unit, to VND120,000 for a ground floor unit. Housing units were only built in 2001 but are already dilapidated with little maintenance done on either the structures themselves or the infrastructure. The road running through the site is obviously not maintained ever since the construction of the site. Units suffer from damp conditions and residents complain that there has been no maintenance carried out.

9.23 Newly built apartment blocks, like Vung Thung, Man Thai, and Hoa Cuong, provide higher design standards in comparison with old resettlement blocks. These apartment blocks are five-storey high. Units have 50m^2 to 65m^2 space. Rental fees vary depending on location. Tenants have to pay an average of VND3,000–5,000 per square meter. In Vung Thung apartment block model A and B which is mainly provided for government workers in the policy-favored list, floor areas vary from 69 m^2 to 88 m^2 with two to three rooms, private toilet, bathroom, and kitchen. The high-quality Le Dinh Ly apartment block is built for middle- to high-income government workers. The units' floor areas vary from 80 m^2 to 100 m^2 with two to three rooms, private toilet, bathroom, and kitchen.

(c) Utilities

9.24 A hundred percent (100%) of the apartments have running water, electricity, drainage, and sewerage systems. However, generally speaking, the drainage and sewerage systems were not comprehensively planned with the buildings, road system, and neighborhood. Solid waste collection is not efficient, particularly in resettlement sites.

(d) Living Conditions

9.25 The living conditions in new apartment sites are mostly affected by solid waste

and sewage. LIHAS HIS results indicated that 22.5% of households were dissatisfied with their neighborhood's environment, primarily due to environmental pollution such as garbage, sewage, and water from drainage.

9.26 In addition, one fourth of surveyed households felt bad and very bad about the security in their respective neighborhoods. The main reason cited was the presence of criminal youth gangs and alcoholics. It implies that this social issue is critical among new residents in new apartment blocks, especially in resettlement blocks.

9.27 Moreover, public facilities in new apartment sites are not fully considered. Most of them do not have kindergartens, common spaces or supermarkets. Residents also find it difficult to access public services such as medical centers, public transportation or educational facilities. Only about 50% of households answered that they could access medical centers and primary schools located within walking distance (below 500 m) from their houses. About 90% of respondents rarely or never used buses. Two reasons given were that they are not familiar with public transportation and that public transportation, particularly bus services, were not available in new urban development areas in Danang.

9.28 Green parks or open spaces were also not considered in the apartments' surroundings. A total of 62.5% of people living in new apartments expressed that parks are not within walking distance from their homes. In most apartment sites, the areas surrounding the apartments were not planned well for common and public uses, and no public facilities, such as street lights, benches, and children's playgrounds, were installed.

(3) Housing Maintenance

9.29 In fact, the HMC has no detailed plans for housing maintenance or improvement of this housing type. Moreover, most of the people living in newly built apartment blocks are poor or low-income people most of whom cannot pay rental fees. Some low-income people said that even if the city government exempts them from rental fees for the first three years, they still would not know where to get the payment after the grace period because their incomes could not provide even for their basic needs, much more so for rental fees. At the same time, the money that the HMC collects from housing rental fees is also not sufficient for periodic maintenance works. Thus, it can be surmised that the current mechanism used in developing new public apartments will not be sustainable in the long term.

(4) Implementation of Housing Provision

9.30 The DOC is the lead agency that implements the proposal in collaboration with other agencies. It is specifically in charge of developing and supervising technical matters related to housing design, unit cost, structural design, and construction quality. It is also in charge of finding sites for housing development. Actual construction is assigned to public enterprises under the DPC, DOC, DONRE, and other departments or PMUs. As for management, DONRE is in charge of preparing suitable land policies and incentives for housing development as well as managing public housing stock. Notwithstanding the housing proposal's plan to mobilize capital for housing provision from various sources such as the private sector, foreign investment, and government budget, so far, capital is only coming from government budget. And after two years of implementation, the Danang City government is now experiencing fund shortage for housing provision. This situation has led to the suspension of some housing projects. In parallel, the DOC is now reconsidering design standards of typical units to reduce construction cost. This means that future public

housing will have lower standards than what have already been built, which actually is already of low standard as far as users' satisfaction is concerned.

9.31 The overall housing provision framework in Danang has different modes of provision in terms of key actors, resources, and target users. It can be summarized that housing in Danang is provided through the three (3) main channels described below.

(a) Public Housing Provision in the Housing Development Proposal

9.32 In this mechanism, the city government and its departments play major roles, as shown in Figure 9.3.1. Target beneficiaries of this public housing provision are resettlers, policy-favored people and those at the lower brackets of the housing market such as the low income, government officers, students, etc. Land and finance, the two most fundamental resources for housing provision, are all provided for by the Government. Even though it is stated in the Housing Development Proposal that the city government will issue policies to mobilize various resources for housing development, particularly the participation of the private sector. But, so far, no private participation in this channel of public housing provision has occurred.

9.33 As an expected consequence of such public housing provision, the government is always at the losing end and will eventually experience a shortage of financial resources just to keep the mechanism sustainable, especially so that the governments usually set very ambitious targets in their program. After five years of accelerated public housing development (2000–2005) and one year of the promulgation of the housing proposal, the Danang City government is now experiencing fund shortage. Some projects are suspended for reconsideration of the unit's standards and construction costs, which is a very risky strategy since previous constructions already have relatively low quality. Further reducing the cost, in fact, may all the more jeopardize the program's objective of providing sustainable housing in the future.

(b) Resettlement Housing Provision

9.34 Resettlement housing provision is carried out on a project basis, targeting specific project-affected people for resettlement. This mechanism uses part of the projects' resources for its implementation. Danang has quasi-administrative organizations representing the government in resettlement housing provision: resettlement board and three compensation and clearance boards. They act in collaboration with the concerned PMUs for each project. If projects are initiated by the government, such as the PIIP or other urban beautification, resources must come from the government and implementation must be the responsibility of relevant government agencies such as the PIIP PMU. If it is a commercial development project, the private developers are responsible for resource mobilization and implementation.

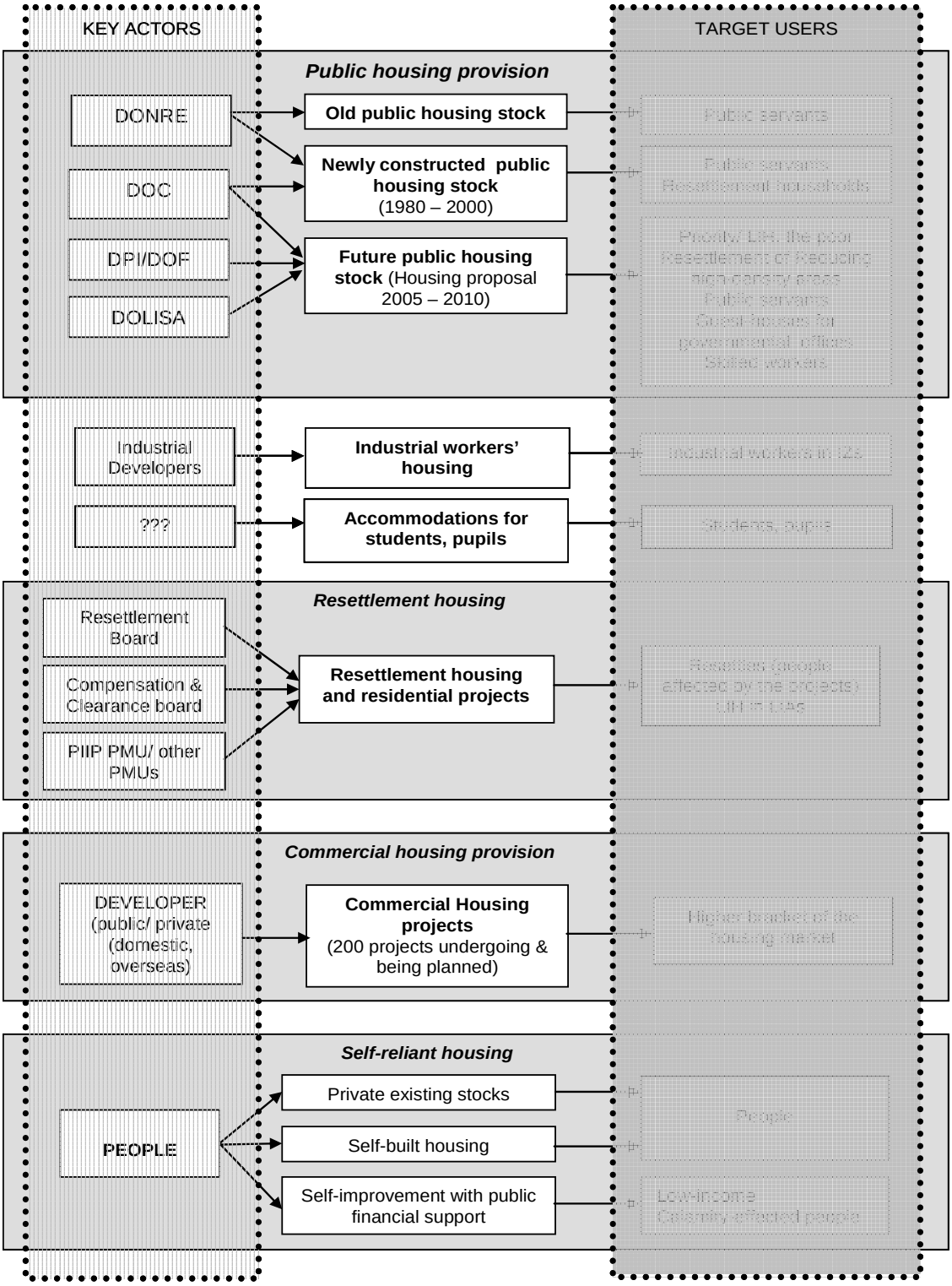
(c) Commercial Residential Development

9.35 This is based on the demand–supply market mechanism. In accordance with urban development plans, developers (each public or private) invest in undeveloped lands and turn them into land plots with infrastructure and put on sale to those who can afford to buy and build houses. It is obvious that this mechanism is provided for higher-income-bracket consumers in the housing market.

9.36 Apart from these three clearly distinguishable channels of housing provision in Danang, there must be housing provision activities by the people: people make housing construction or improvement themselves either through their own initiative or some form of

support. The poor and calamity-affected people in Danang can get financial support from the government for housing improvement by themselves. Unfortunately, there is no clear record of volume of such housing activities in any related city department.

Figure 9.2.2 Overall Housing Provision Framework in Danang



Source: Assessment of Housing for Low Income Groups in Danang, Vietnam, WB, 2006.

9.3 People's Assessment on Housing

9.37 Table 9.3.1 shows the people's assessment of housing conditions and needs. From the data, it could be understood that most people own their houses, many of which are detached houses. The average living area per household is 107.9 m^2, and when this is compared to the desired living space in the future, the most popular range is 100–150 m^2, which is actually quite close to the present conditions. Most people regarded detached houses as the desired type of housing; so this condition is also met. Thus this is most likely why the results show that more than 80% of residents are more or less satisfied with their present living conditions.

9.38 Table 9.3.2 shows the funding sources of respondents to address their housing needs. Nearly 90% of the respondents did not borrow money for house purchase, and 85% of the respondents said they do not intend to do so even if loans are available. However, those who borrowed money for house purchase did so mainly from both banks/financial institutions and relatives/friends. But the results show that respondents prefer to borrow money from banks/financial institutions rather than relatives/friends. Around 30% of the respondents' property was used as collateral for house purchases.

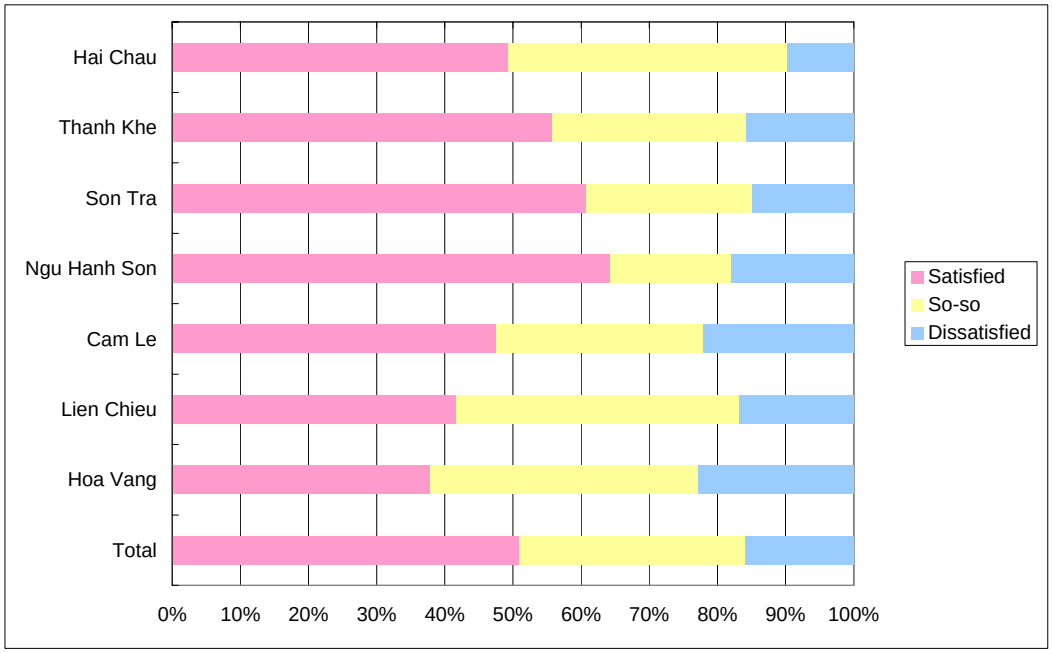
Table 9.3.1 People's Opinion on Current and Future Housing Conditions in Danang

			Hai Chau	Thanh Khe	Son Tra	Ngu Hanh Son	Cam Le	Lien Chieu	Hoa Vang	Total
Situation of Present Living Conditions	Ownership (%)	Owner-occupied	98.5	95.6	95.8	97.3	98.8	93.7	98.5	96.9
		Sate-owned house for rental	0.2	1.8	0.3	0.0	0.0	0.0	0.1	0.5
		Private-owned house for rental or borrow	0.9	1.4	1.8	1.8	1.0	5.6	0.8	1.7
		Group-owned or religion's house	0.2	0.1	0.4	0.3	0.0	0.7	0.0	0.2
		Joint ownership of state and individual	0.2	0.5	0.4	0.6	0.0	0.0	0.1	0.3
		Uncertain ownership	0.1	0.6	1.3	0.0	0.2	0.0	0.4	0.4
	Average Number of Household Members		3.9	4.0	4.1	4.0	3.8	3.9	3.8	3.9
	Average Living Area	per household [m2]	97.8	96.0	117.3	131.7	113.3	144.3	91.0	107.9
		per person [m2/person]	25.0	23.9	28.7	32.5	29.8	37.1	23.7	27.3
	Type of House (%)	Traditional house	8.0	0.6	0.8	0.8	1.0	1.4	0.5	2.6
		Apartment	5.3	0.2	0.4	1.5	0.0	0.6	0.0	1.6
		High-rise apartment	0.2	1.4	0.3	0.3	0.0	0.0	0.0	0.4
		Detached house	86.4	97.8	98.5	97.4	99.0	98.0	99.5	95.4
Assessment of Present Living Conditions	Satisfaction with Existing Housing Conditions (%)	Dissatisfied	9.7	15.8	14.9	18.0	22.0	16.8	22.8	15.9
		So-so	40.9	28.5	24.3	17.7	30.4	41.5	39.3	33.2
		Satisfied	49.4	55.7	60.8	64.2	47.6	41.7	37.9	50.9
	Reason for Dissatisfaction (%)	Space	27.7	23.8	24.8	16.1	18.7	21.0	12.3	20.8
		Air flow / Ventilation	16.8	21.6	20.7	29.8	6.6	18.2	15.8	18.2
		Sunlight	0.4	1.2	1.8	0.8	1.1	4.5	8.4	2.9
		Location	10.9	19.8	14.4	4.8	9.3	12.5	16.1	13.8
		Rent (if applicable)	1.3	0.9	0.5	1.6	0.5	1.7	0.6	0.9
		Design	8.0	11.0	4.1	16.1	18.7	14.2	12.3	11.5
		Structure	21.8	14.0	22.5	23.4	34.6	15.3	27.4	22.3
		Maintenance	6.3	2.7	2.7	4.0	4.4	6.8	1.6	3.8
		Other	6.7	4.9	8.6	3.2	6.0	5.7	5.5	5.9
Desire for Future Living Conditions	Affordable Amount for House Purchase (thousand VND)		416,835	1,761,380	27,291	5,650	1,841	266,736	24,664	357,771 (average)
	Desired Living Space (%)	> 30 m2	0.2	0.1	0.0	0.3	0.0	0.2	0.1	0.1
		30—50 m2	1.5	2.3	1.5	0.0	0.7	1.5	1.0	1.4
		50—75 m2	13.0	14.4	6.2	1.2	2.9	2.1	7.6	8.7
		75—100 m2	39.2	47.6	21.0	2.9	20.1	8.0	19.6	28.1
		100—150 m2	31.2	27.2	54.6	60.8	46.9	32.8	37.4	38.3
		150 m2 <	14.9	8.4	16.7	34.9	29.4	55.4	34.2	23.3
		Average [m2] 1)	108	100	120	140	130	147	129	119
	Desired Type of Housing (%)	Traditional house	8.3	1.6	3.3	1.2	1.2	7.8	3.8	4.4
		High-rise apartment	0.5	0.6	0.3	0.3	0.0	1.0	4.2	1.0
		Medium-rise apartment (4—5 stories)	10.7	6.0	1.5	0.9	1.9	11.2	9.2	6.8
		Detached house	79.0	89.8	94.6	97.1	95.9	79.2	74.6	85.7
		Other	1.5	2.0	0.4	0.6	1.0	0.8	8.2	2.2
	Prefered Location (%)	Urban center	44.9	23.9	6.9	8.1	2.2	5.7	3.7	19.0
		Thanh Khe	1.8	60.6	0.3	2.9	1.2	13.5	1.3	15.0
		Hai Chau	45.3	4.4	11.3	6.1	3.8	9.0	2.9	15.9
		Son Tra	1.5	0.7	79.9	1.5	0.7	1.9	1.9	13.2
		Other districts	2.4	1.2	0.7	0.9	0.5	1.7	1.0	1.4
		Ngu Hanh Son	1.2	2.7	0.4	79.9	0.0	0.6	0.1	6.5
		Cam Le	1.4	2.5	0.3	0.3	90.9	0.4	2.2	8.9
		Lien Chieu	1.2	3.7	0.1	0.0	0.0	65.9	1.5	8.2
		Hoa Vang	0.3	0.4	0.1	0.3	0.7	1.3	85.4	12.1

Source: DaCRISS HIS, 2008.

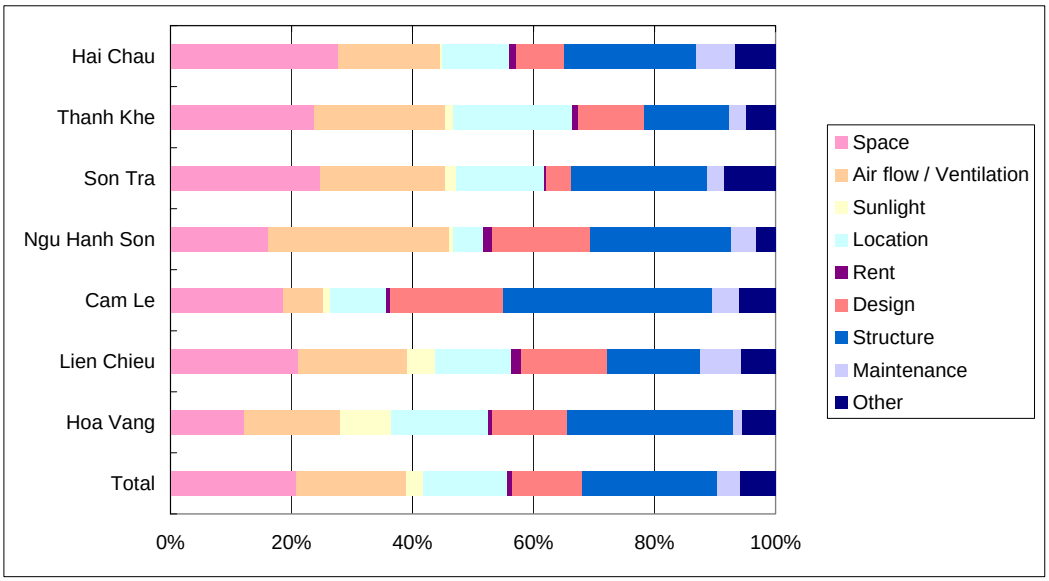
[1] Average value was calculated using median values for each value range, assuming the respondents answering maximum and minimum ranges have the same trend as other ranges.

Figure 9.3.1 People's Level of Satisfaction with Current Housing Conditions in Danang



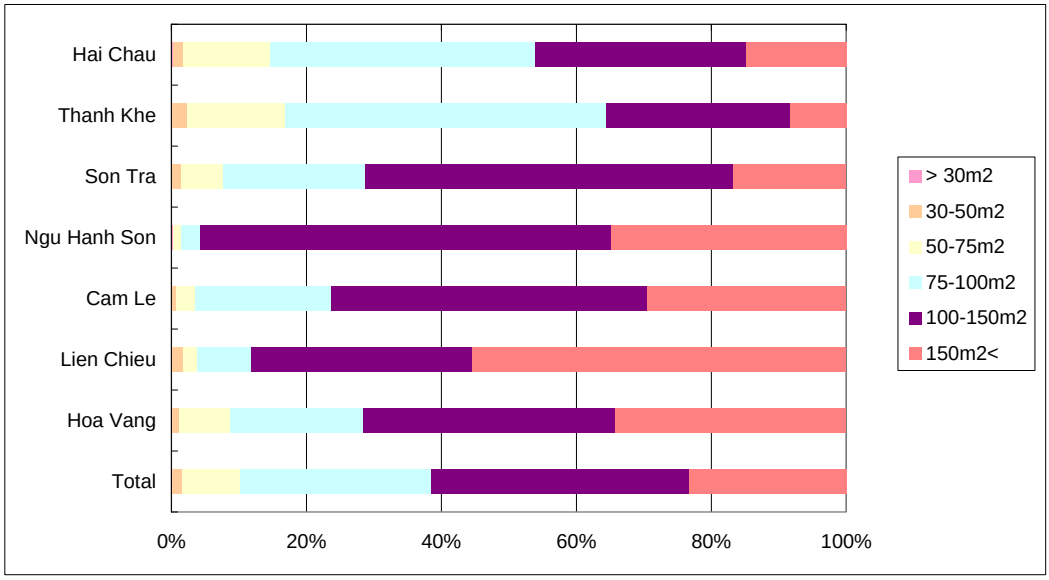
Source: DaCRISS HIS, 2008.

Figure 9.3.2 People's Reasons for Dissatisfaction with Existing Housing Conditions in Danang



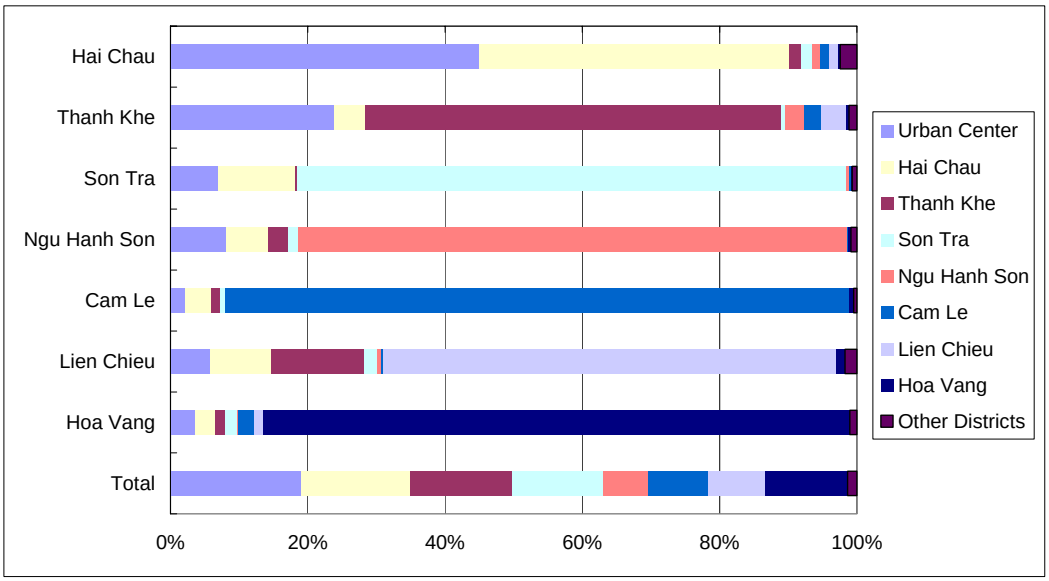
Source: DaCRISS HIS, 2008.

Figure 9.3.3 People's Preferences for Living Space in Danang



Source: DaCRISS HIS, 2008.

Figure 9.3.4 Danang People's Residential Preferences in the Future



Source: DaCRIS HIS, 2008.

Table 9.3.2 Danang People's Funding Sources for Housing Needs

		Hai Chau	Thanh Khe	Son Tra	Ngu Hanh Son	Cam Le	Lien Chieu	Hoa Vang	Total
Borrow Money for House Purchase (%)	Yes	5.1	4.9	8.0	24.7	20.6	7.6	22.1	10.7
	No	94.9	95.1	92.0	75.3	79.4	92.4	77.9	89.3
Money for House Purchase Borrowed From (%)	Bank or financial institution	57.6	41.5	50.0	39.6	43.2	43.9	40.2	44.1
	Relatives or friends	30.3	34.0	24.2	47.3	37.5	48.8	39.0	37.7
	Private money lender(s)	4.5	5.7	4.8	2.2	1.1	4.9	5.5	4.1
	Credit association (eg Women's Union, etc.)	7.6	15.1	8.1	11.0	13.6	2.4	15.2	11.7
	Resettlement PMUs	0.0	3.8	11.3	0.0	3.4	0.0	0.0	2.1
	Other	0.0	0.0	1.6	0.0	1.1	0.0	0.0	0.4
Property Used as Collateral for House Purchase (%)	Yes	46.0	25.5	43.3	7.1	30.2	25.0	36.4	30.8
	No	39.7	70.6	53.3	91.8	67.4	67.5	63.6	65.7
	Don't know	14.3	3.9	3.3	1.2	2.3	7.5	0.0	3.5
Money Initially Borrowed for House Purchase (million VND)		214,380	24,393	797,435	1,650	2,830	52,405	64,507	165,371 (average)
Whether to Borrow Loans for House Purchase if Available (%)	Yes	7.1	4.5	3.5	12.6	16.1	13.0	7.3	7.8
	No	79.7	92.1	95.3	86.5	72.7	74.3	89.7	85.3
	Don't know	13.1	3.4	1.2	0.9	11.3	12.8	2.9	6.9
If Available, Money for House Purchase would be Borrowed From (%)	Bank or financial institution	80.9	74.5	59.3	79.5	44.0	72.5	75.5	69.1
	Relatives or friends	11.2	9.8	14.8	15.9	8.3	8.7	11.3	10.8
	Private money lender(s)	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.2
	Credit association (eg Women's Union, etc.)	6.7	7.8	22.2	4.5	29.8	15.9	13.2	14.6
	Resettlement PMUs	1.1	5.9	3.7	0.0	3.6	0.0	0.0	1.9
	Other	0.0	2.0	0.0	0.0	13.1	2.9	0.0	3.4
If Available, Preferred Loan Repayment Plan (%)	Pay 50% of total amount and pay the rest for 10 years	29.9	31.3	34.6	0.0	23.3	22.9	12.2	22.5
	Pay 50% of total amount and pay the rest for 20 years	13.8	8.3	19.2	4.7	12.3	7.1	16.3	11.4
	Pay 25% of total amount and pay the rest for 10 years	16.1	12.5	3.8	0.0	8.2	11.4	6.1	9.6
	Pay 25% of total amount and pay the rest for 20 years	19.5	18.8	15.4	46.5	17.8	37.1	20.4	25.0
	Borrow 100% and repay for 10 years	3.4	4.2	0.0	20.9	6.8	5.7	24.5	8.8
	Borrow 100% and repay for 20 years	14.9	22.9	11.5	27.9	8.2	14.3	16.3	15.9
	Other	2.3	2.1	15.4	0.0	23.3	1.4	4.1	6.8
If Available, Amount of Money to Borrow (million VND)		29,320	12,160	6,210	6,910	7,740	12,685	8,445	11,924 (average)
If Available, Affordable Amount of Repayment (thousand VND/month)		185,311	92,705	51,050	52,353	82,900	91,902	82,307	91,218 (average)

Source: DaCRISS HIS, 2008.

10 LIVING CONDITIONS

10.1 Overview

10.1 The living conditions in Danang City can be summarized as follows:

(i) There is urban–rural disparity in infrastructure, services, and facilities; pollution in Lien Chieu district; high flood vulnerability; and need to improve safety and security;

(ii) The most significant result of a survey on the people's assessment of the living environment, utilities, and access to urban services showed that Hoa Vang residents felt the most dissatisfied among all districts in almost all aspects of life; and

(iii) The people also felt there is need for Danang City to improve safety and security, prevent flood/natural disasters, improve sanitary conditions, protect the natural environment, prevent pollution, enhance the landscape, reduce poverty and generate wealth, pursue industrialization, improve the services sector, pursue high-tech industries and education, and create employment.

10.2 Methodology to Assess Living Conditions

10.2 An overall assessment on the living conditions was conducted through a Household Interview Survey (HIS) asking the opinions on the current situation in 5,000 households in Danang City. The HIS is conducted to obtain a basic data for formulating comprehensive urban and transportation master plan. The result of the HIS can be utilized not only as an essential database for acquiring existing travel behaviors of people and forecasting future traffic demand, but also as an important resource for understanding present evaluations and opinions on existing urban services, living conditions, water systems and landscape which are also the key components of this study, and for making evaluation indicators for the future policies on those issues. It is expected that this survey will reveal the following issues:

(i) The importance of related urban issues (transport, urban services, living conditions, water systems and landscape) of the study interiorly and exteriorly

(ii) People's assessments and opinions on existing urban issues

(iii) Impact on urbanization by community level (negatively and positively)

10.3 Table 10.2.1 shows the surveyed items in HIS. Some results are shown in this chapter, while detailed results of the survey is presented in the Urban Karte (refer to ***Part V***), which describes the living conditions of the city by commune and district.

Table 10.2.1 Survey Items for HIS

	Item		Content
Basic Question	(1) Socioeconomic information	• Household information	• Household Composition • Housing Information, History of Migration • Household Income etc.
		• Individual information	• Age, Sex, Occupation, Income • Vehicle Ownership etc.
	(2) Trip information	• Trip information done in the previous day	• Trip Purpose • Origin/Destination, Departing/Arriving time, Transfer Point • Travel Mode (including pick-up/send-off) • Travel Time, Cost etc.
	(3) Assessment on trip	• Trip information done in the previous day	• Whole Trip (Time, Cost, convenience, comfortability) • By travel mode • By Time, purpose etc.
	(4) Assessment on present traffic conditions	• Individual opinions	• Traffic safety (accident experience and opinions for traffic safety) • M/C usage and walking environment • Public transport (Bus and others) • Parking etc.
	(4) Assessment on transport policies	• Individual opinions	• Condition for infrastructure development • Public transport • Traffic management and enforcement etc.
Additional Questions	(1) Urban Services	• Individual opinions	• Accessibility, assessment and needs for future on major urban services
	(2) Living environment	• Individual opinions	• Accessibility, assessment and needs for future on living environment (safety, healthiness, convenience and comfortability)
	(3) Housing	• Individual opinions	• Present condition (area size, structure, no. of room, years, ownership) • Assessment and needs for future
	(4) Water system	• Individual opinions	• Present accessibility to water (water pipe etc.) • Assessment on present condition (accessibility, water pressure, available time, water quality) • Payment condition (water fee, purchase of drinkable water) and willingness to pay etc.
	(5) Sewerage system	• Individual opinions	• Present condition of sewerage system • Assessment on present condition (accessibility, smell, etc.) • Payment condition and willingness to pay etc.
	(6) Green space	• Individual opinions	• Present accessibility to green space • Assessment on present condition and needs for the future • Desirable green function and type etc.
	(7) Landscape	• Individual opinions	• Desirable landscape • Assessment on present condition by landscape type • Opinions to landscape preservation etc.

Source: DaCRISS HIS, 2008.

10.3 Overall Assessment

10.4 Results in Table 10.3.1 shows the people's assessment of the living environment, utilities, and access to urban services in Danang City. Scores were calculated by weighting the respondent's answers with their satisfaction levels. Perhaps the largest issue that can be noticed is that Hoa Vang scored lower than other districts in almost all aspects. This is especially evident for flood, greenery, landscape, utilities (e.g., water supply and solid waste collection), and access to urban amenities such as parks/green spaces, entertainment facilities, and public transportation. As Hoa Vang is the sole rural district in Danang City, more effort and resources have to be channeled here to provide the residents with services comparable to those available to urban residents. People in Ngu Hanh Son rated highly for their living conditions.

1) People's Concern

10.5 Tables 10.3.2 show the people's concerns about the living conditions in Danang City. Results show that the service quality for health, pollution control, and disaster prevention needs improvement in its service quality. Pollution in Lien Chieu is conspicuous as shown by the fact that the level of pollution in the area is considered "bad" by respondents at 35%, which is the highest among all districts. Many believe that the main sources of pollution are industrial zones and traffic, and almost all respondents felt that pollution in the area leads to poor health. All of these results indicate the people's concerns about pollution. On the other hand, 71% of people in Son Tra feel that pollution is low. Another critical issue is disaster prevention, especially in Hoa Vang.

2) Preferred Measures

10.6 Results in Table 10.3.3 indicate that more than 60% of the respondents felt the need for all measures listed, of which the following was especially agreed: improving safety and security, preventing flood / natural disasters, improving sanitary conditions, protecting natural environment, preventing pollution, enhancing landscape, reducing poverty, generating wealth, pursuing industrialization, improving the services sector, pursuing high-tech industry and education, and creating employment. What is interesting is that, Danang City still feels the need to reduce poverty, generate wealth, and create employment despite a GDP per capita of USD1,170, or almost 1.5 times the national average and with 87% of its population being urban dwellers. This implies that poverty is still an issue among the public.

10.7 A safe and secure urban environment is important not only to residents, especially children, but also to foreign investors and tourists, and to create a positive image of the city. This image promotes the city's direction for Danang to become an attractive and safe city in the eyes of the international community.

Table 10.3.1 People's Assessment of Living Conditions in Danang City by District, 2008

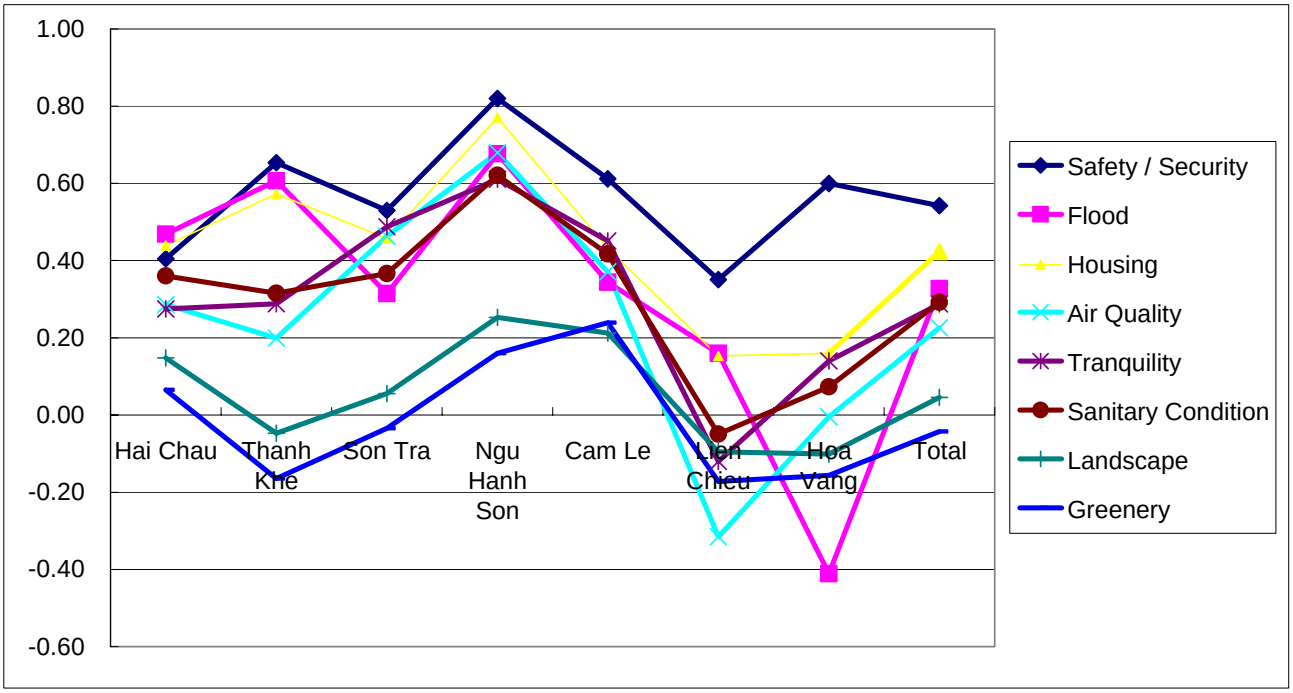
			Hai Chau	Thanh Khe	Son Tra	Ngu Hanh Son	Cam Le	Lien Chieu	Hoa Vang	Total
Living Environment	Safety / Security	Score 1)	0.40	0.65	0.53	0.82	0.61	0.35	0.60	0.54
		% dissatisfied 2)	10.3	11.3	13.3	8.4	12.7	15.6	5.8	11.0
	Flood	Score 1)	0.47	0.61	0.31	0.68	0.34	0.16	-0.41	0.33
		% dissatisfied 2)	10.3	10.6	19.2	12.0	29.5	23.2	41.5	19.0
	Housing	Score 1)	0.44	0.57	0.46	0.77	0.43	0.15	0.16	0.42
		% dissatisfied 2)	9.5	9.2	8.4	4.4	8.6	13.4	13.2	9.8
	Air Quality	Score 1)	0.29	0.20	0.46	0.68	0.37	-0.32	0.00	0.23
		% dissatisfied 2)	12.7	23.2	9.4	12.2	16.5	35.8	21.9	18.4
	Tranquility	Score 1)	0.27	0.29	0.49	0.61	0.45	-0.12	0.14	0.29
		% dissatisfied 2)	16.9	21.4	7.2	16.9	17.3	26.4	15.5	17.2
	Sanitary Condition	Score 1)	0.36	0.32	0.37	0.62	0.42	-0.05	0.07	0.29
		% dissatisfied 2)	10.7	19.4	15.0	7.9	10.1	23.4	16.1	15.0
	Landscape	Score 1)	0.15	-0.05	0.06	0.25	0.21	-0.10	-0.10	0.05
		% dissatisfied 2)	17.0	30.7	23.4	13.1	7.2	21.8	22.9	21.1
	Greenery	Score 1)	0.06	-0.16	-0.03	0.16	0.24	-0.17	-0.16	-0.04
		% dissatisfied 2)	23.3	36.5	26.8	19.5	16.6	28.7	26.2	27.2
Utility Services	Power Supply	Score 1)	0.39	0.42	0.29	0.76	0.59	0.38	0.19	0.39
		% dissatisfied 2)	5.9	8.9	9.0	8.7	9.3	14.8	10.9	9.1
	Water Supply	Score 1)	0.40	0.53	0.38	0.60	-0.05	0.35	-0.75	0.33
		% dissatisfied 2)	6.8	7.0	5.0	8.1	37.5	17.4	46.8	12.3
	Gas Supply	Score 1)	0.45	0.39	0.56	1.15	1.00	0.25	0.00	0.46
		% dissatisfied 2)	3.6	4.3	0.0	0.0	0.0	0.0	26.3	5.7
	Telecom	Score 1)	0.43	0.55	0.51	0.98	0.61	0.55	0.19	0.50
		% dissatisfied 2)	5.0	1.3	0.9	1.2	4.3	10.2	6.0	3.9
	Solid Waste Collection	Score 1)	0.39	0.64	0.48	0.73	0.54	0.53	-0.12	0.49
		% dissatisfied 2)	6.4	4.1	3.6	4.2	11.3	10.4	32.3	7.5
Access to Urban Services	To Market (daily supply)	Score 1)	0.20	0.66	0.46	0.63	0.45	0.31	0.18	0.39
		% dissatisfied 2)	12.7	3.6	7.2	1.5	8.5	9.5	14.6	8.8
	To Health Care Centers	Score 1)	0.05	0.50	0.28	0.62	0.22	0.13	0.15	0.25
		% dissatisfied 2)	14.0	9.7	9.2	2.1	16.0	18.1	15.2	12.3
	To Public Transportation	Score 1)	0.03	0.17	-0.01	0.50	0.13	0.04	-0.33	0.04
		% dissatisfied 2)	17.1	24.6	19.5	2.4	22.1	19.5	39.8	21.7
	To Primary School	Score 1)	0.27	0.54	0.41	0.63	0.60	0.35	0.25	0.40
		% dissatisfied 2)	8.4	4.7	1.6	1.8	3.1	9.5	8.7	5.9
	To Parks / Green Spaces	Score 1)	0.01	0.17	-0.13	0.24	0.07	0.01	-0.52	0.01
		% dissatisfied 2)	20.6	23.8	29.5	17.6	23.0	27.3	51.8	25.5
	To Entertainment Facilities	Score 1)	-0.07	0.18	-0.18	0.12	0.11	0.00	-0.52	-0.03
		% dissatisfied 2)	24.3	22.1	31.9	22.8	19.1	26.3	50.8	26.7
	To Public Administrative Office	Score 1)	-0.02	0.35	0.27	0.61	0.55	0.50	0.20	0.28
		% dissatisfied 2)	17.1	11.7	6.1	2.3	3.7	7.4	8.3	10.0

Source: DaCRISS HIS, 2008.

[1] Score was calculated based on: Highly satisfied=+3, Satisfied=+1, So-so=0, Dissatisfied=–1, Highly dissatisfied=–3.

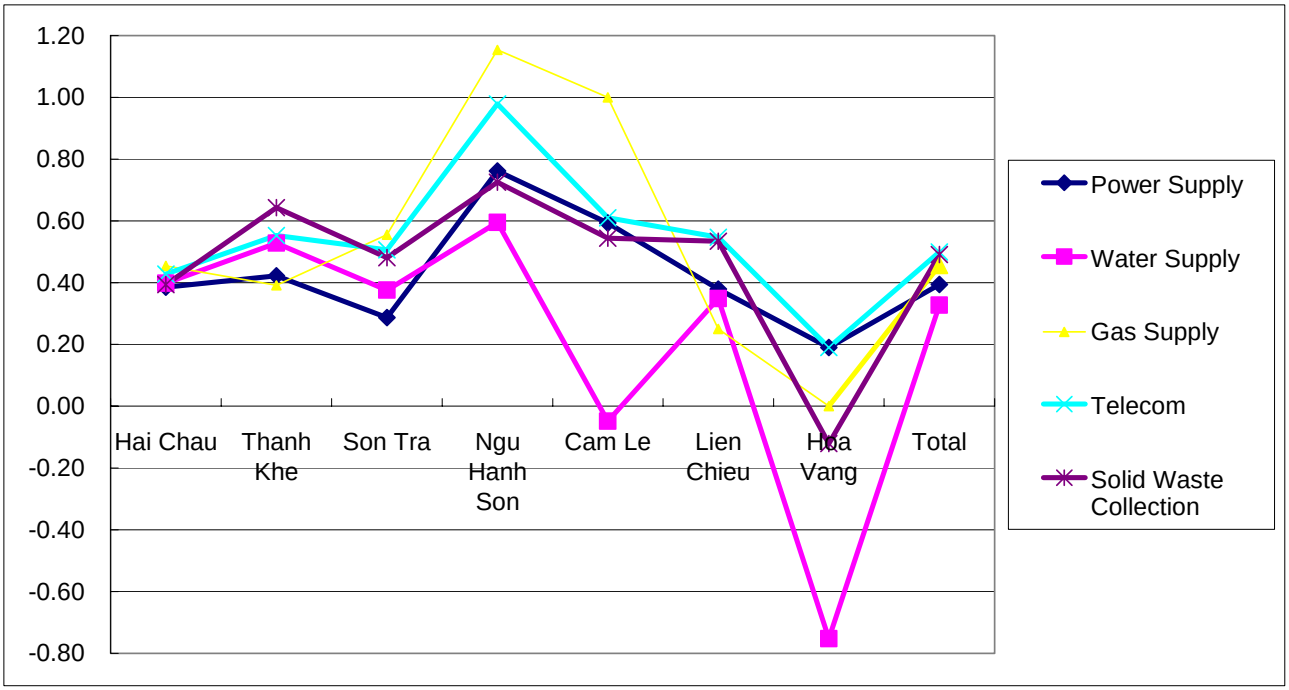
[2] Including % who answered "dissatisfied" and "highly dissatisfied."

Figure 10.3.1 People's Assessment of the Living Conditions in Danang City by District, 2008



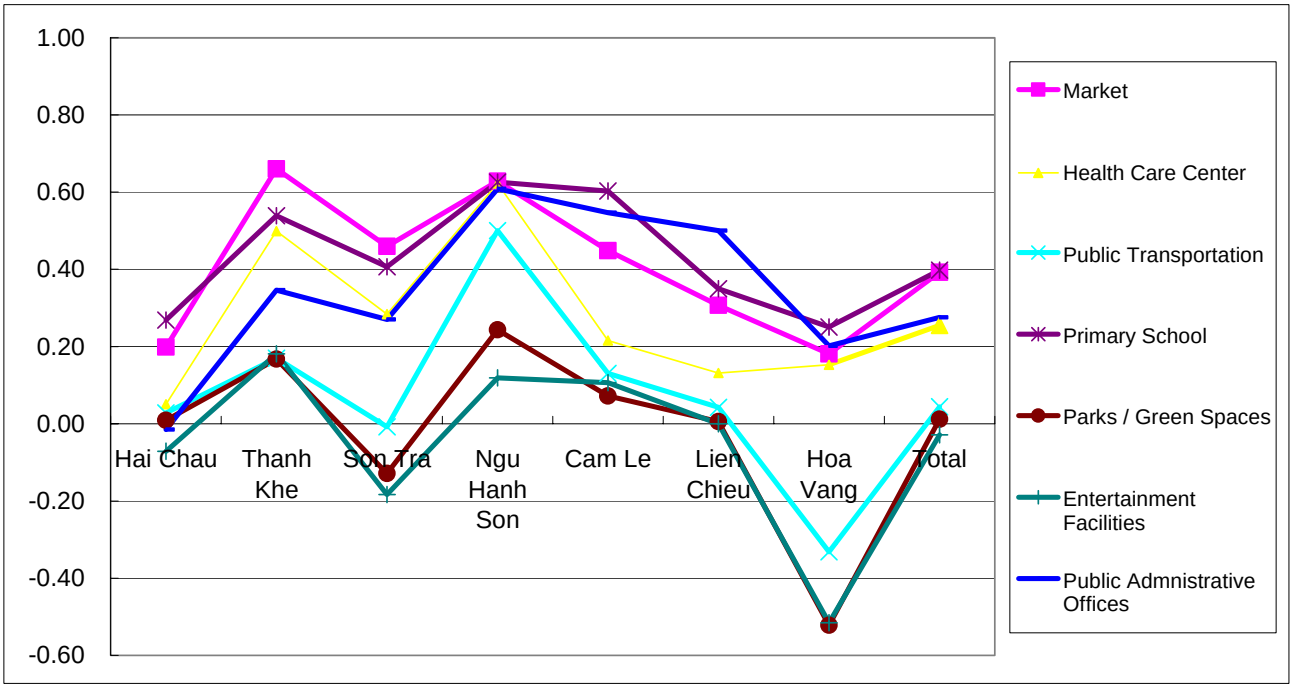
Source: DaCRISS HIS, 2008.

Figure 10.3.2 People's Assessment of Utilities in Danang City by District , 2008



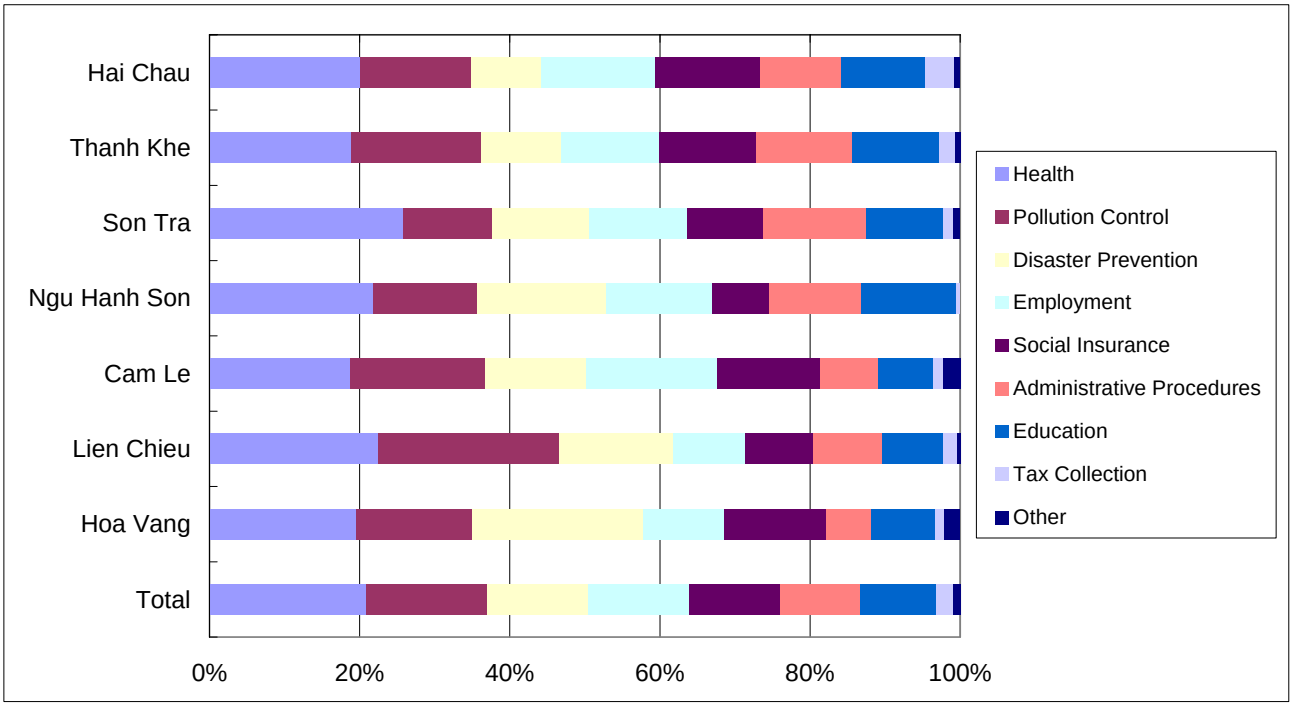
Source: DaCRISS HIS, 2008.

Figure 10.3.3 People's Assessment of Access to Urban Services in Danang City by District, 2008



Source: DaCRISS HIS, 2008.

Figure 10.3.4 Need for Improved Environment and Services in Danang City by District



Source: DaCRISS HIS, 2008.

Table 10.3.2 Concerns about Living Conditions in Danang City by District

		Hai Chau	Thanh Khe	Son Tra	Ngu Hanh Son	Cam Le	Lien Chieu	Hoa Vang	Total
Need for Improvement in Service Quality (%)	Health	20.1	18.9	25.7	21.8	18.8	22.4	19.6	20.9
	Pollution control	14.8	17.3	11.9	13.8	18.0	24.2	15.3	16.1
	Disaster prevention	9.3	10.6	13.0	17.2	13.5	15.2	22.9	13.5
	Employer-job seeker matching	15.3	13.2	13.1	14.1	17.3	9.6	10.7	13.4
	Social insurance	13.9	12.9	10.1	7.6	13.7	9.0	13.7	12.1
	Administrative procedures	10.8	12.8	13.6	12.2	7.7	9.1	5.9	10.6
	Education	11.2	11.6	10.3	12.8	7.3	8.3	8.6	10.3
	Tax collection	3.9	2.1	1.4	0.5	1.3	1.8	1.2	2.1
	Other	0.8	0.7	0.9	0.0	2.3	0.4	2.1	1.0
Important Aspects to be Improved (%)	Safety / Security	9.0	8.3	12.7	13.2	6.4	11.5	4.3	9.1
	Greenery	8.9	11.2	9.7	10.5	1.2	7.1	6.2	8.4
	Landscape	7.5	10.0	8.1	10.7	9.3	6.9	4.6	8.0
	Air Quality	7.0	8.3	4.8	6.5	9.1	11.0	6.9	7.5
	To Parks / Green Spaces	6.8	7.6	8.2	6.6	1.1	6.4	9.9	7.1
	Sanitary	5.3	6.7	7.6	7.1	7.2	5.8	6.1	6.4
	To Entertainment Facilities	6.6	6.5	8.0	7.6	1.1	5.7	5.5	6.2
	To Health Care Centers	7.6	3.8	6.5	4.1	10.1	6.2	5.1	6.1
	Flood	3.5	4.7	5.0	3.8	9.0	5.8	11.0	5.7
	To Public Transportation	6.1	5.9	5.0	4.0	4.8	3.5	8.1	5.6
	Housing	6.7	4.9	3.5	3.4	6.7	7.5	4.4	5.4
	Tranquility	6.9	7.0	2.5	4.7	5.4	4.6	2.4	5.1
	Water Supply	1.3	2.3	2.4	5.3	7.6	3.9	10.0	3.9
	To Public Administrative Office	4.6	2.8	3.6	2.3	5.2	2.0	0.9	3.2
	Power Supply	1.9	3.6	5.0	3.3	3.8	2.5	2.7	3.1
	To Market (daily supply)	4.0	1.7	2.6	0.4	4.9	1.9	3.3	2.8
	Solid Waste Collection	1.6	2.0	1.0	2.9	4.1	1.8	5.8	2.5
	To Primary School	3.0	1.1	2.0	1.4	1.4	3.9	1.1	2.1
	Telecom	0.9	1.1	0.9	0.9	1.3	1.5	0.8	1.0
	Gas Supply	0.7	0.4	0.8	1.3	0.2	0.6	0.8	0.7
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Level of Pollution in Area (%)	Bad	7.1	16.3	10.5	15.1	19.4	35.0	21.8	16.1
	So-so	29.0	14.7	18.7	19.2	41.1	46.1	45.9	28.9
	Low	63.8	69.0	70.8	65.7	39.5	18.9	32.3	55.0
Main Sources of Pollution in Area (%)	Industrial zone	2.5	4.5	10.9	2.0	5.2	19.5	5.7	8.1
	Large factories outside IZ	1.3	2.6	5.0	2.8	1.5	9.1	4.9	4.3
	Household craft enterprises	14.0	8.3	10.0	26.5	6.2	8.5	11.6	10.9
	Residential households / commercial enterprises / offices	21.2	19.8	18.5	11.6	13.3	11.6	7.2	14.8
	Agriculture, fisheries or forestry	3.2	2.4	14.2	11.2	10.9	4.0	14.6	7.6
	Hospital	4.4	1.4	3.3	0.8	2.8	2.1	0.3	2.3
	Traffic	28.4	30.5	18.7	21.3	19.5	26.4	27.3	25.9
	Chemical	4.7	8.0	2.8	2.8	27.0	6.2	13.9	9.3
	Construction	18.4	18.7	13.7	18.1	8.5	11.1	11.6	14.1
	Waste disposal sites	1.9	3.6	3.0	2.8	5.2	1.5	2.9	2.7
Impacts of Pollution in Area (%)	Poor health	98.2	97.6	96.0	94.4	93.7	94.3	96.6	96.1
	Less / no	1.3	1.2	1.3	1.6	3.0	0.7	1.7	1.5
	Lost / reduced assets	0.4	1.2	1.3	3.2	3.0	3.2	1.7	1.9
	Other	0.0	0.0	1.3	0.8	0.4	1.8	0.0	0.6

Source: DaCRISS HIS, 2008.

Table 10.3.3 Preferred Measures to Improve Living Conditions in Danang City by District

		Hai Chau	Thanh Khe	Son Tra	Ngu Hanh Son	Cam Le	Lien Chieu	Hoa Vang	Total
Improve Safety / Security (%)	Low	1.7	0.5	0.0	0.0	4.5	0.6	0.3	1.0
	So-so	17.1	16.1	8.4	27.6	27.5	7.4	21.9	16.8
	High	81.2	83.4	91.6	72.4	67.9	92.0	77.8	82.2
Prevent Flood / Natural Disasters (%)	Low	1.6	0.5	0.4	0.9	5.3	0.6	0.3	1.2
	So-so	19.9	22.0	11.6	22.7	19.4	16.2	10.2	17.5
	High	78.5	77.5	88.0	76.5	75.4	83.2	89.5	81.3
Provide Better Housing (%)	Low	1.6	0.2	0.0	0.3	3.3	0.8	0.0	0.8
	So-so	16.7	28.0	23.2	25.6	30.9	10.3	13.3	20.7
	High	81.6	71.9	76.8	74.1	65.8	89.0	86.7	78.5
Improve Sanitary Conditions (%)	Low	1.4	0.6	0.8	0.3	3.3	0.4	0.4	1.0
	So-so	16.7	19.3	12.5	25.0	30.1	13.0	9.8	17.0
	High	82.0	80.1	86.7	74.7	66.5	86.7	89.8	82.1
Protect Natural Environment (%)	Low	0.9	0.6	0.4	0.3	1.2	0.8	0.3	0.6
	So-so	13.0	15.5	13.8	25.3	25.8	12.0	6.1	14.5
	High	86.1	84.0	85.8	74.4	73.0	87.2	93.6	84.8
Prevent Pollution (%)	Low	1.0	1.0	0.3	0.3	1.0	0.8	0.7	0.8
	So-so	10.8	14.2	14.9	24.7	16.7	9.7	5.8	12.8
	High	88.2	84.8	84.9	75.0	82.3	89.5	93.4	86.4
Enhance Landscape (%)	Low	1.3	0.8	0.4	0.3	6.0	0.8	0.6	1.2
	So-so	17.7	13.9	18.3	35.8	24.4	15.6	8.2	17.3
	High	81.0	85.3	81.3	64.0	69.6	83.6	91.2	81.5
Improve Electricity Supply (%)	Low	1.8	1.0	0.4	0.3	3.3	0.8	1.0	1.2
	So-so	34.4	41.2	30.7	40.7	40.4	24.6	20.3	33.2
	High	63.8	57.8	68.9	59.0	56.2	74.7	78.7	65.5
Improve Water Supply (%)	Low	2.3	1.0	0.4	0.3	3.1	0.6	1.5	1.4
	So-so	36.7	43.2	34.8	39.2	28.9	21.1	10.1	32.0
	High	60.9	55.8	64.8	60.5	67.9	78.3	88.5	66.6
Improve Waste Collection (%)	Low	1.9	1.6	0.3	0.3	14.4	0.2	0.6	2.2
	So-so	37.0	45.2	35.5	41.6	40.0	32.6	18.6	36.1
	High	61.1	53.1	64.3	58.1	45.7	67.2	80.8	61.8
Improve Public Transportation (%)	Low	1.5	1.2	0.0	0.3	4.5	0.2	0.4	1.1
	So-so	25.9	24.5	19.9	35.8	22.7	22.1	13.5	23.0
	High	72.6	74.3	80.1	64.0	72.7	77.7	86.1	75.9
Improve Transportation in General (%)	Low	2.1	1.4	0.1	0.3	2.9	0.2	0.6	1.2
	So-so	21.1	22.3	16.9	36.0	23.2	15.2	13.7	20.3
	High	76.8	76.3	83.0	63.7	73.9	84.6	85.7	78.5
Reduce Poverty (%)	Low	2.2	4.6	0.5	0.3	0.2	0.2	0.3	1.7
	So-so	12.1	8.1	10.9	21.2	9.8	5.1	8.3	10.3
	High	85.8	87.3	88.6	78.5	90.0	94.7	91.4	88.1
Generate Wealth (%)	Low	1.9	0.2	0.3	1.5	0.7	0.6	0.7	0.9
	So-so	12.3	7.9	17.8	25.6	11.2	10.3	9.5	12.4
	High	85.8	91.9	81.9	73.0	88.0	89.1	89.8	86.7
Pursue Industrialization (%)	Low	1.2	0.6	0.3	0.0	2.2	3.4	0.6	1.1
	So-so	11.7	16.8	15.4	28.2	14.4	18.9	5.3	14.6
	High	87.1	82.6	84.3	71.8	83.5	77.7	94.2	84.4
Improve Services Sector (%)	Low	0.8	0.2	0.5	0.0	1.2	0.8	0.9	0.6
	So-so	8.2	7.5	11.3	23.3	12.4	9.1	4.5	9.5
	High	91.0	92.3	88.2	76.7	86.4	90.1	94.6	89.9
Pursue High-Tech Industry and Education (%)	Low	0.6	0.1	0.1	0.0	1.9	0.6	0.4	0.5
	So-so	8.7	10.8	16.6	25.0	15.8	13.1	6.0	12.1
	High	90.7	89.1	83.3	75.0	82.3	86.3	93.6	87.4
Create Employment (%)	Low	1.5	0.4	0.0	0.3	1.0	0.4	0.6	0.7
	So-so	5.7	6.2	8.2	20.9	6.5	5.0	1.9	6.7
	High	92.8	93.4	91.8	78.8	92.6	94.7	97.5	92.6

Source: DaCRISS HIS, 2008.

11 ENVIRONMENT MANAGEMENT

11.1 Overview

11.1 The environmental situation in Danang can be summarized in the problems listed below. These problems should be considered with regard to the objective of Danang authorities to make it an example of an environmental city.

(i) Great concern with urban effluents, often mixed together with industrial effluents, and pollution caused by aquaculture, which affect rivers, urban lakes, and coastal zones (in particular Danang Bay);

(ii) Poor quality of groundwater and lack of databases on the situation of aquifers. According to a DONRE official, data exist but these “have not yet been approved by the People’s Committee”;

(iii) Large number of construction projects (infrastructure, housing, commercial, and tourism facilities), resulting in land reclamation which in turn has adversely affected coastal forests and riverbank stability;

(iv) Solid wastes dumped in water bodies, such as urban rivers, lakes, and sea, and problems raised by the partial treatment of medical and industrial wastes; and,

(v) Illegal activities such as forest cutting, hunting, and fishing, which are not quantified but which remain a matter of concern.

11.2 Risk management should be considered as part of the environmental review due to their direct or indirect effects on the natural milieu. Danang is not so much exposed to earthquakes and—according to authorities—tsunamis. But clearly, Danang is vulnerable to various other natural disasters such as typhoons and floods, and potentially, to forest fires and industrial disasters due to the presence of harbors (e.g., petrol spill). Other parts of Danang like Son Tran Island are also vulnerable to landslides.

11.3 The city has taken appropriate decisions to preserve the environment, such as:

(i) Relocating polluting industries to industrial zones and planning to relocate petrol ports facilities;

(ii) Deciding not to develop the industrial sector excessively;

(iii) Conducting ODA projects, in particular those by the World Bank, the Dutch and Australian governments, in sectors such as solid waste, water supply, or wastewater;

(iv) Creating protected areas, such as the Ba Na forest zone, although the question on how these areas can be effectively protected remain; and,

(v) Keeping traffic at better levels than that in Hanoi or HCMC.

11.4 The main concern for the future is environmental management. With a population estimated to reach 1.5 million by 2020, the promotion of sectors such as tourism, and the effects of further land reclamation, infrastructure construction, air pollution from handicraft villages, among others, will create potential major environmental issues, as follows:

(i) Water resource conservation and management to meet future demand and requirements for a sustainable development;

(ii) Impact of future hydropower projects such as Song Nam Song Bac Dam and Tuy Lan Dam in Hoa Vang District;

(iii) Solid waste management due to the fragile institutional arrangement opted for by

URENCO as a result of its uncertain financial standing;

(iv) Effects of land reclamation on the natural environment due to the development of infrastructure, tourism and service facilities, and housing; and,

(v) Management of risks, particularly floods, and possibly the transportation of hazardous matters as well as airplane accidents due to the expected increase in air traffic.

11.5 In addition, and from the perspective of developing tourism, the issue of preserving land and marine biodiversity, as well as protecting the forests, should be considered urgent.

11.2 Current Environmental Situation

1) Overall Situation

11.6 In general, the environmental load being borne by Danang City as a result of economic growth and rapid urbanization has been increasing since 1997. In the industrial sector for example, an average of 16.5% p.a. growth was recorded between 1997 and 2006, which led to an increase in the number of households to about 60,000 during the same period. As a result, approximately 30,000 ha of land was developed and became urbanized.

11.7 Industrial development has practically played the role of engine to the remarkable economic growth Danang has experienced. At the same time, however, it has brought tremendous diseconomies to the society in the form of environmental deterioration, which would eventually become economic losses in the long run. In order to accommodate manufacturing industries, six industrial parks/zones (KCN) were developed with an area of 1,400 ha. At present, a total of 170 factories, covering garments, textile, rubber, fishery, and electric machinery, etc., are located there. Environmental management has now become a very critical issue in the pursuit of industrial development, because both the government and factory owners have not taken sufficient measures to counter the adverse environmental impacts of industries. No adequate environmental engineering facilities and utilities have been installed, resulting in serious pollution levels particularly in Bau Tram, Hoa Khan, and Lien Chieu.

11.8 Tourism is a very promising business in Danang City, attracting around 150,000 international tourists and benefitting some 107 hotels in 2006. At present, around 30 tourism or hotel construction projects are being carried out in the coastal areas. This has led to major concerns about further environmental degradation due to wastewater discharge and its negative impacts on marine habitats.

11.9 Fishery is an indigenous and important industry in Danang City. Between 1997 and 2006, it enjoyed an annual growth of 8.3%. In 2006, aquafarming covered about 620 ha. This industry, however, needs further careful environmental measures in order not to worsen the conditions of the marine environment and resources.

11.10 The focus should therefore be on developing effective strategies to achieve sustainable socioeconomic development without degrading the environment and natural resources. The economic benefits accruing from industrial and tourism development should not be pursued at the expense of the environment. Harmonization between development and conservation is key to building a workable environmental management mechanism.

2) Water Resources

11.11 The amount of surface water reserve from the river system accounts for 8.3 billion m^3, of which 7.7 billion m^3 comes from the Han River and 0.7 billion m^3 from the Cu De River. A further 39.1 billion m^3 is reserved in ponds and reservoirs. Domestic use of water accounts for only 1.77% of the total water reserve.

11.12 In Danang City, groundwater is extracted at 6,550 m^3 per day for urban activities, of which 54% is dedicated for domestic use and 35% for industrial and tourism uses.

11.13 The biodiversity of Danang's sea and coastal resources is high, with about 500 species of fish, 30 of which are highly valuable commercially. Coral reefs are extensive, covering about 105 ha and home to 191 species. However, it is reported that only 9.6% of

the reefs are in good condition, 8.8% are fair, and 81.5% are in bad condition.

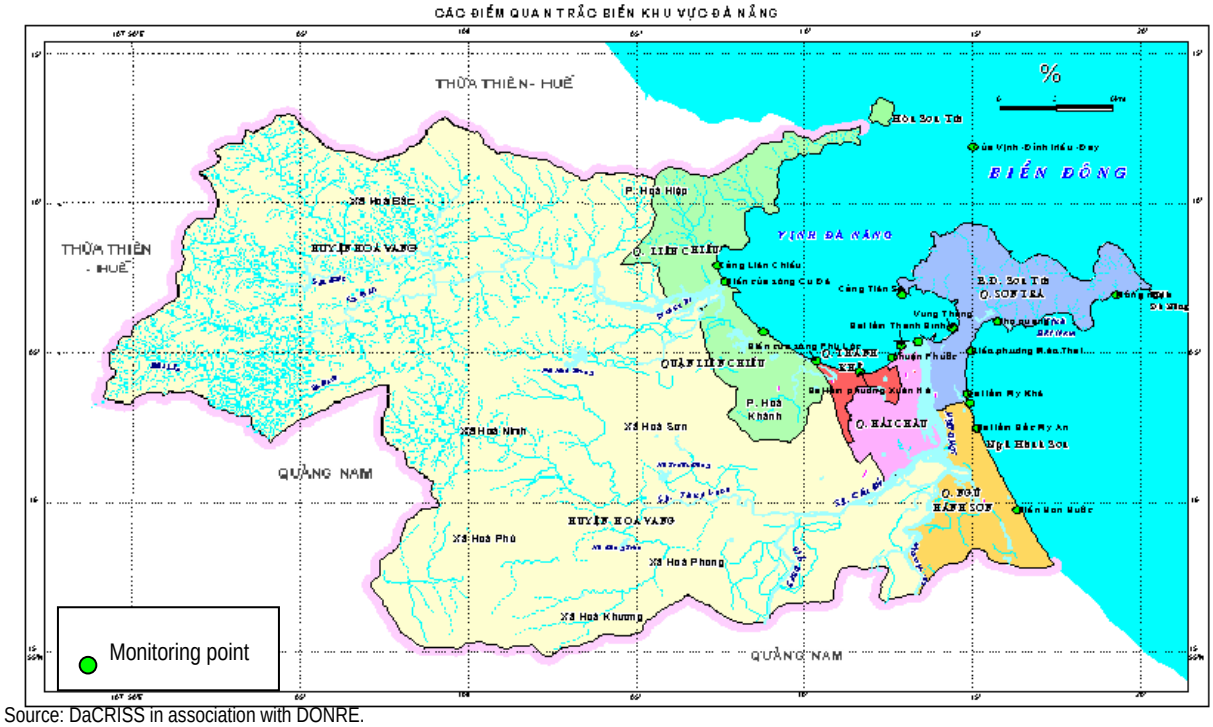
11.14 Water contamination is serious almost everywhere in the city. The coastal water in Danang Bay and the downstream and midstream areas of the Han River are contaminated with coliform at alarming levels. The Phu Loc and Cu De rivers are also polluted with nutrients (N, P), organic substances (COD, BOD), as well as traces of petrol and heavy metals (Cd). It is reported that shallow groundwater sources in Lie Chieu, Cam Le, and Ngu Hanh So have high levels of nutrients (NO_3), coliform, and heavy metals (mercury, lead, iron, etc.). Detailed information and analysis are shown in subsequent paragraphs.

(1) Seawater Quality

11.15 The seas around Danang are divided into two, i.e., Danang Bay and Eastern Sea. The total coastline of Danang City is 70 km, 30 km of which has favorable conditions for development as resorts. In general, seawater quality along the Eastern Sea coast is rather good but that in Danang Bay is polluted, with the most polluted section being that from Thuan Phuoc to Cu De River estuary. Pollutants in coastal seawater include organic substances such as COD, NH_4^+ traces of heavy metals, oil, and microorganisms (e.g., coliform).

11.16 There are 17 monitoring points in Danang City with 10 (B1–B10) located in the Eastern Sea and seven (B11–B17) in Danang Bay (see Figure 11.2.1).

Figure 11.2.1 Monitoring Points for Seawater Quality in Danang City

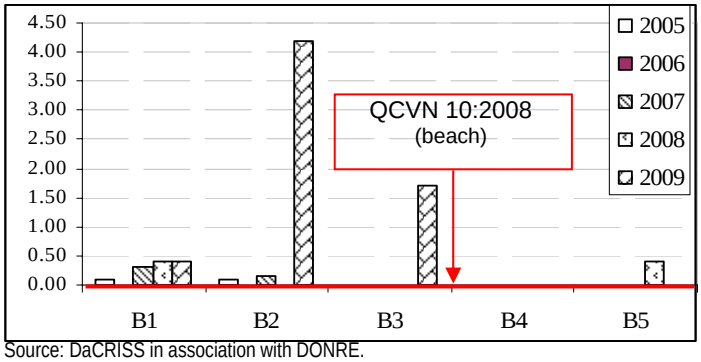


Source: DaCRISS in association with DONRE.

11.17 In general, the monitoring points in the Eastern Sea (except for that at Tho Quang shipping region) have not recorded any signs of pollution from organic substances, TSS, heavy metals (except for Fe) since 2005. At Tho Quang Anchorage Station, the content of NH4+ exceeded QCVN 10:2008/BTNMT (other places) standards by 3.43 times in 2008 and 17.57 points in 2009, with the trend of increase was compared with the 2008 figure. In 2007–2009, the Fe content of seawater in the Eastern Sea was noticeable. The concentration of Fe exceeded QCVN 10:2008/BTNMT standards by 0.35 to 2.80 points in al-

most all monitoring points, except for three, namely South Son Tra Mountain beach, Mong Ngua rock strip, and Tien Sa Seaport. Monitoring results showed that the oil content in seawater exceeded the permissible limits stated in QCVN 10:2008/BTNMT (beach) by about 0.1 to 4.2 points from 2005 up to now. The trend even showed increasing pollution in the latter years, especially at Bac My An Beach and Non Nuoc Beach.

Figure 11.2.2 Oil in Seawater at Danang Beaches



Source: DaCRISS in association with DONRE.

Note: QCVN 10:2008/BTNMT: National technical standard on coastal seawater quality. The beach points (B1, B2, B3, B4, B5) were compared with QCVN 10:2008/BTNMT beach standard; the remaining points were compared with QCVN 10:2008/BTNMT other places standard

Photo 11.2.1 Tho Quang Anchorage

Source: DaCRISS in Association with DONRE.

11.18 Pollution of seawater in Danang Bay has reached serious levels. From 2005 up to now, there has been COD pollution at beaches in Danang Bay. Compared with QCVN 10:2008/BTNMT, the content of COD exceeded by 1.75 to 4.54 points, although in 2009, BOD content did not increase compared with that in previous years. QCVN 10:2008/BTNMT did not define the maximum allowable content of COD in coastal seawater serving other purposes.

11.19 Compared with QCVN 10:2008/BTNMT, the content of NH4+ exceeded by 0.01 to 6.05 points in the following points: Thanh Binh Beach, Thuan Phuoc fish port, and the beach next to Phu Loc River estuary, with the Thuan Phuoc fish port having the highest NH4 content.

11.20 Compared with QCVN 10:2008/BTNMT, the content of NH_4^+ exceeded by 0.01 to 6.05 points at these points: Thanh Binh beach, Thuan Phuoc fish portr and beach next to Phu Loc River estuary. Thuan Phuoc fishing harbor showed the highest pollution levels. According to the monitoring results in Table 11.2.1, the number of coliform in almost all the monitoring points in Danang Bay exceeded QCVN 10:2008/BTNMT from 2005 to 2009 and showed an increasing trend. It was only the beach next to Cu De River estuary, Lien Chieu Port, which did not exceed permitted levels in 2009. Meanwhile, from 2007 to 2009, the content of Fe in the seawater in most of the monitoring points exceeded QCVN

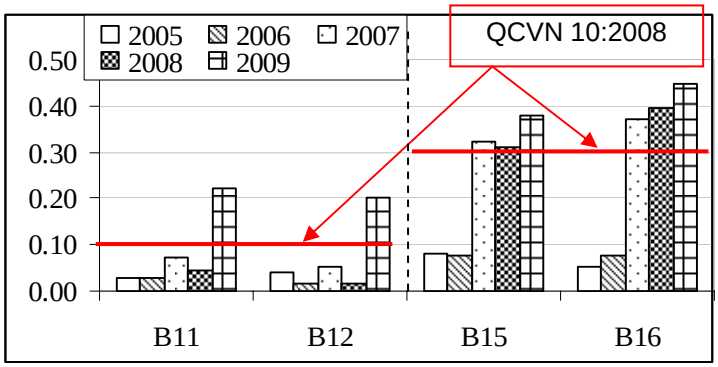
10:2008/BTNMT from 0.03 to 1,].20 points and showed an increasing trend, except for Thuan Phuoc fish port, Lien Chieu beach, and Lien Chieu Port. The excess levels of Fe compared with the standards for seawater in Danang Bay are shown in Figure 11.2.3.

Table 11.2.1 Coliform Presence in Seawater in Danang Bay

Monitoring Points	Points Exceeding QCVN 10:2008/BTNMT				
	2005	2006	2007	2008	2009
Thanh Binh Beach (*) ;B11	124.88	120.38	35.68	17.98	441.27
Xuan Thieu Beach (*):B12	11.23	2.48	5.24	4.38	80.93
Thuan Phuoc Fishing Harbor;B13	114.22	43.02	20.33	12.93	11,711.92
Lien Chieu Beach;B14	42.72	1.62	4.99	6.48	8.32
Beach next to Cu De River Estuary;B14	-	0.01	3.28	-	-
Beach next to Phu Loc River Estuary;B15	-	184.72	5.25	-	0.20
Lien Chieu Port;B16	n.a.	n.a.	n.a.	n.a.	-

Source: DaCRISS in association with DONRE
Note:
(-): not exceed QCVN 10:2008/BTNMT
(*) The value on the monitoring point at Thanh Binh and Xuan Thieu beaches were compared with QCVN 10:2008/BTNMT – National technical standard on coastal seawater quality for beach standard. The value on remaining points were compared with QCVN 10:2008/BTNMT other places standard.

Figure 11.2.3 Fe in Seawater in Danang Bay



Source: DaCRISS in association with DONRE.

11.21 In recent years, seawater quality has deteriorated and remained largely uncontrolled due to various reasons listed below.

(i) Untreated urban wastewater (households' wastewater, industrial wastewater, services, aquaculture and agricultural waste, etc.) is the main polluting source of seawater;

(ii) Danang Bay is affected by leakage from the city's two dumping sites (one old and the other new) and wastewater from two industrial parks in Lien Chieu District, the Hoa Khanh and Lien Chieu industrial parks;

(iii) Danang sea is also affected by wastewater from vessels mostly small coastal fishing boats, which ply the waters near the coast;

(iv) Seawater around Tho Quang port is also by wastewater from the seafood market, Danang seafood service industrial park (12 seafood service establishments are operating there), and other fishing activities together with the waste generated from the activities at the port. From 2002 when the Danang seafood service industrial park was established until the end of 2009, the wastewater treatment facility has not constructed.

(v) Some areas in Danang are poor, where residents earn a living by exploiting natural resources. Since their awareness of natural resources and biodiversity is still limited,

public involvement in protecting the environment is low and ineffective; and,

(vi) Oil spills have also occurred in coastal areas which considerably affected the marine environment and ecosystem in Danang.

(2) River Water Quality

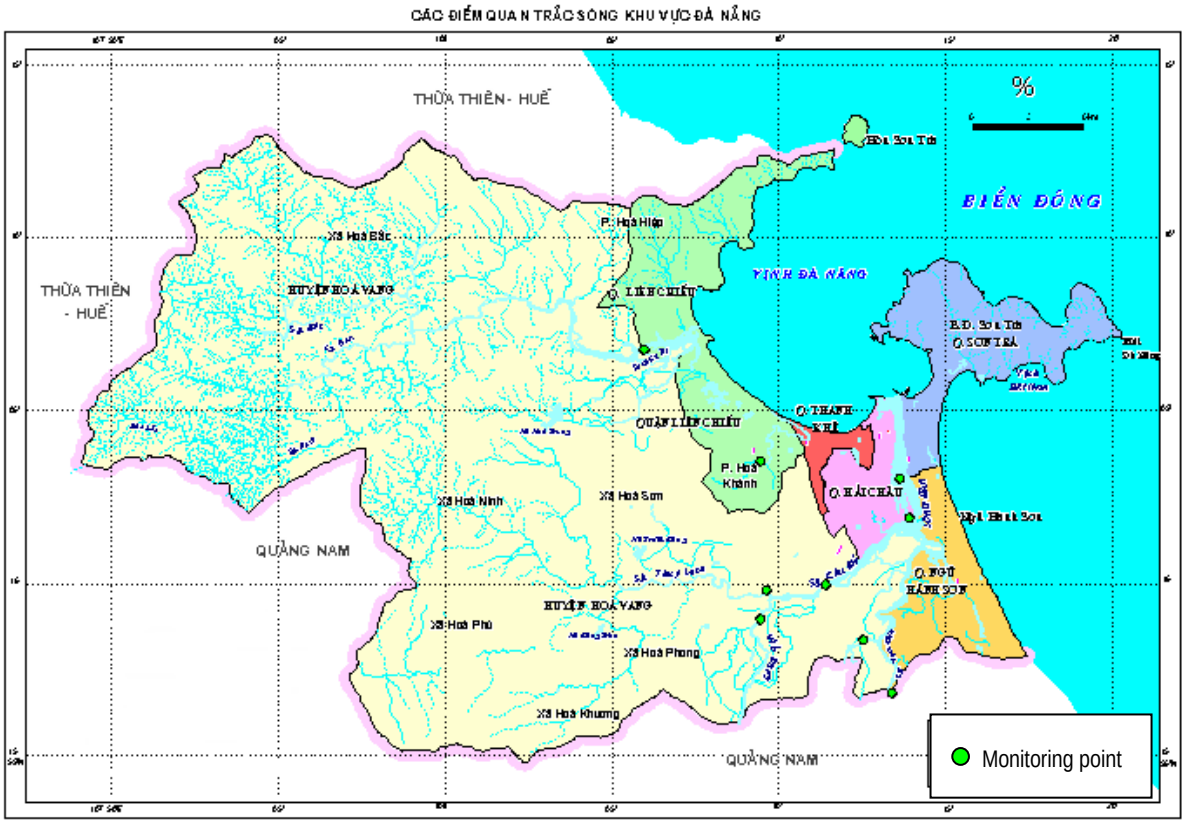
11.22 Rivers in Danang City originate from the west and northwest of the city and from Quang Nam province. Most of the rivers are short and sloping. Danang has three river basins: Han River, which belong to Vu Gia river basin, Cu De River, and Phu Loc River. The first two are important sources of potable and irrigation water. Currently, these three rivers are not only water sources but are also receptacles for wastewater from various sources.

Photo 11.2.2 Han River

Source: DaCRISS in Association with DONRE

11.23 **Han River:** This river's water quality in five monitoring points (see Figure 11.2.4) is shown in Table 11.2.2.

Figure 11.2.4 Monitoring Points for River Water Quality in Danang City



Source: DaCRISS in association with DONRE.

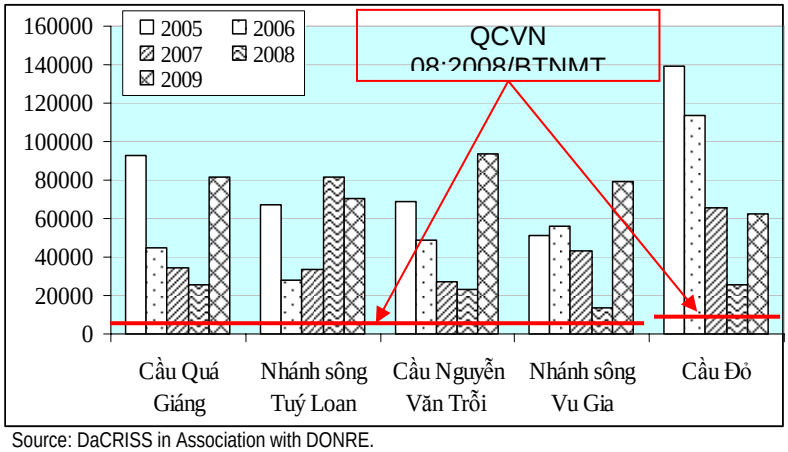
Table 11.2.2 Water Quality of Vu Gia River Basin

Monitoring Point	Year	Points Exceeding QCVN 08:2008/BTNMT							
		BOD_5	COD	SS	NO_2^-	NH_4^+	NO_3^-	PO_4^{3-}	Coliform
1. Qua Giang Bridge	2005	-	-	-	-	-	-	-	11.36
	2006	-	-	-	1.09	-	-	-	5.02
	2007	-	-	-	0.21	-	-	-	3.60
	2008	-	-	0.97	-	-	-	-	2.47
	2009	-	-	0.37	-	-	-	-	9.85
2. Tuy Loan River Branch	2005	-	-	-	-	-	-	-	8.00
	2006	-	-	-	0.99	-	-	-	2.78
	2007	-	-	-	0.25	-	-	-	3.49
	2008	-	-	0.86	-	-	-	-	9.87
	2009	-	-	0.53	-	-	-	-	8.36
3. Nguyen Van Troi Bridge	2005	-	-	-	-	0.20	-	-	8.20
	2006	-	-	-	1.34	-	-	-	5.48
	2007	-	-	-	3.76	-	-	-	2.67
	2008	-	-	-	-	-	-	0.38	2.12
	2009	-	-	-	1.27	-	-	-	11.44
4. Vu Gia River Branch	2005	-	-	-	-	-	-	-	5.80
	2006	-	-	-	1.17	-	-	-	6.51
	2007	-	-	0.13	0.33	-	-	-	4.80
	2008	-	-	1.89	-	-	-	-	0.82
	2009	-	-	0.80	-	-	-	-	9.52
5. Do Bridge(*)	2005	-	-	0.50	-	-	-	-	26.87
	2006	0.08	0.03	0.04	2.41	-	-	-	21.80
	2007	-	-	1.67	1.28	-	-	-	12.17
	2008	-	-	3.84	0.35	-	-	-	4.10
	2009	0.08	-	1.56	0.26	-	-	-	11.50

Source: DaCRISS in association with DONRE
Note:
- (-): not exceed QCVN 08:2008/BTNMT
- (*): The monitoring point at Do bridge was compared with QCVN 08:2008/BTNMT – National technical standard on surface water quality level A2 – Serving for water use supply but ought to apply suitable treatment technology.
- The remaining monitoring points were compared with QCVN 08:2008/BTNMT – National technical standard on surface water quality level B1 – Serving for irrigation or other purposes.

11.24 Pollutants in the Vu Gia River basin include SS, NO_2^- and coliform. In comparison with QCVN 08:2008/BTNMT, the content of NO_2^- exceeded the standard by 0.21–3.76 points, coliform by 0.82–26.87 points, and SS by 0.37–3.84 points in all monitoring points in the Vu Gia River system in the past five years. In 2009, the content of SS, NO_2^- and coliform exceeded the standards, although it decreased compared with previous years' levels. The levels of organic substances (SS, NO_2^-, BOD_5) and coliform in the Do Bridge area, where the main water supply intake is located, are rather high.

Figure 11.2.5 Coliform Levels in the Han River

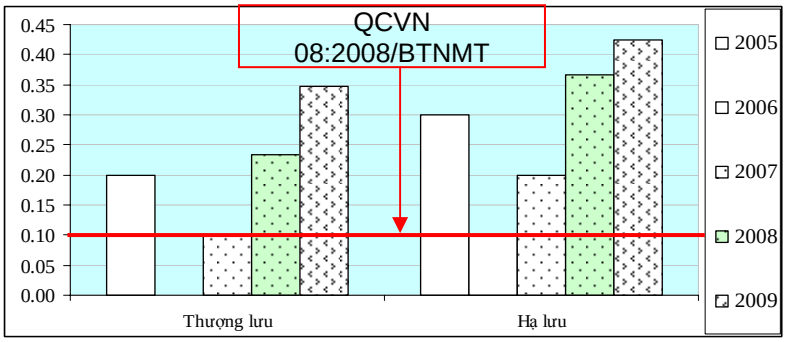


Source: DaCRISS in Association with DONRE.

11.25 **Cu De River:** The Cu De River is located north of Danang City and its basin area is about 472 km^2.. The water of Cu De River is used for irrigating over 300 ha of rice fields in Lien Chieu District and for supporting aquaculture farms of about 600 ha of surface water. The water quality of Cu De River from 2005 to 2009 was polluted with oil, NH4+, PO43-, As, and phenol. In 2009, Cu De River was not polluted yet with heavy metals such as As, Hg, and phenol. Other water pollutants in this river also comply with QCVN 08:2008/BTNMT standards.

11.26 The oil content in Cu De River has been increasing from 2005 to 2009, as shown in Figure 11.2.6. NH_4^+ content also exceeded the standards by 0.04 to 0.48 points, PO_4^{3-} by 0.11 to 0.45 points, and phenol by 0.45 to 1.66 points. The quantity of dissolved oxygen in Cu De River was lower than the standard in 2007, 2008, and 2009. As content in the upper streams of Cu De River exceeded QCVN 08:2008/BTNMT standards in the period 2007 to 2009 by 0.97–10.73 points. However, As content in 2009 was lower compared with that in previous years.

Figure 11.2.6 Oil Content in Cu De River



Source: DaCRISS in association with DONRE.

11.27 **Phu Loc River:** Phu Loc River has a length of more than 5 km, originating from Khanh Son, Hoa Khanh Nam commune, Lien Chieu District. It flows into Danang Bay through the estuary near Nguyen Tat Thanh Street in Thanh Khe Dong and Thanh Khe Tay communes. Environmental pollution in the area, specially near the Phu Loc River estuary, has worsened. Monitoring results of the Phu Loc River water in the period 2005–009 are shown in Table 11.2.3

Pollution in Phu Loc River (Source: DaCRISS in Association with DONRE.)

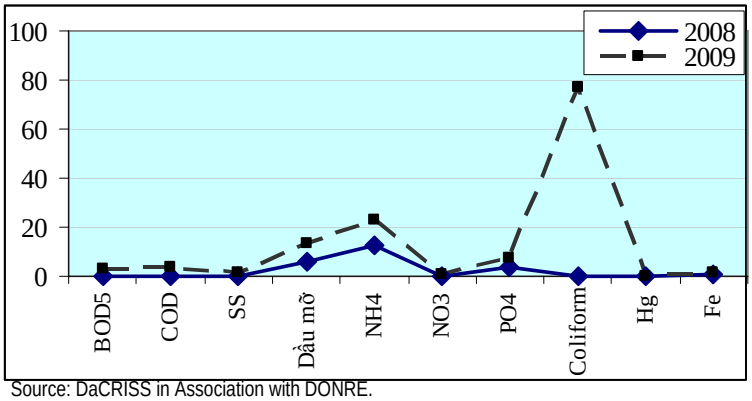
11.28 Phu Loc River is likewise seriously polluted. Most pollutants exceeded QCVN 08:2008/BTNMT - level B1 standards for irrigation water and other purposes. Compared to its condition in 2008, Phu Loc River water has become even more degraded in 2009, to wit: BOD_5 content increased by 2.90 points, COD 3.39 points, SS 1.46 points, oil 7.17 points, NH_4^+ 9.98 points, NO_3^- 0.67 points, PO_4^{3-} 4.36 points, coliform 76.55 points, Hg 0.15 points, and Fe 0.93 points.

Table 11.2.3 Phu Loc River Water Quality, 2005–2009

Pollutant	Points Exceeding QCVN 08:2008/BTNMT				
	2005	2006	2007	2008	2009
DO	0,30	0,28	0,33	0,26	0,16
BOD_5	1,37	0,63	0,86	0,19	3,09
COD	1,29	1,01	0,53	0,11	3,51
SS	-	0,11	-	-	1,46
Oil	1,80	1,20	2,50	6,00	13,17
NH_4^+	33,83	33,91	9,68	12,66	22,64
NO_3^-	-	-	-	-	0,67
PO_4^{3-}	30,37		5,61	3,37	7,73
Coliform	33,11	514,19	45,15	0,20	76,75
CN	-	-	-	-	-
Hg	2,80	-	-	-	0,15
Pb	-	-	-	-	-
Fe	0,29	-	0,68	0,72	1,65
Cu	-	-	-	-	-
Zn	-	-	-	-	-
As	-	-	1,59	-	-
Phenol	9,00	4,10	2,03	2,75	-
Cr^{6+}	-	0,31	-		

Source: DaCRISS in association with DONRE
Notes:
( ): not monitored
(-): not exceed QCVN 08:2008/BTNMT
Phu Loc River water quality was compared with QCVN 08:2008/BTNMT – National technical standard on surface water quality level B1 – Serving for irrigation purpose or other purposes.
In 2005–2007: monitored at military bride; 2008–2009: monitored at Da Co bridge.

Figure 11.2.7 Phu Loc River Quality[1]



Source: DaCRISS in Association with DONRE.
[1] Points that exceeded QCVN 08:2008/BTNMT (Level B1

11.29 The reasons for river water pollution in Danang City are as follows:

(a) **Vu Gia River Basin**

(i) Hydroelectric development in upper-stream in Quang Nam Province and polluting sources in mainland also affected in Danang City. There are 62 projects on hydroelectric development plan in this river basin. This activities in one hand exploits the favorable natural condition to solve electricity utilization demand. On the other hand, those affect the intactness of the river, the biodiversity and water utilization demand in lower reaches in Danang City.

(ii) Onshore activities in adjacent areas, especially in Hoa Vang or activities in rivers, such as illegal sand exploitation, affect the river's stability. Wastes from agriculture,

service and manufacturing sectors. As well as utilization of fertilizers, pesticides, and other chemicals in agriculture also directly affect water quality;

(iii) Wastewater from Hoa Cam industrial park has polluted Han River specially around the Do Bridge area. This industrial park has been operating since ___ but the infrastructure was not accomplished and wastewater treatment facilities have not been built. In the lower reaches of the Han River, the number of small to large trading and service establishments is rather high. Wastewater from these establishments has not been strictly controlled, with some establishments discharging their wastewater directly into the river.

Sand Exploitation in Hoa Vang (Source: DaCRISS in Association with DONRE.)

(b) **Cu De River Basin:** The main sources of pollutants in the Cu De River are industry, households, shipping, agriculture, and forestry.

(i) Based on statistics, about 75% of domestic households are not connected to septic tanks;

(ii) Agricultural and forestry activities in Lien Chieu and Hoa Vang also considerably affect river water quality. The total area occupied by farmlands in 2008 in these two regions was 6,882.74 ha, 55.11% of which are rice paddies. Therefore, the use of chemical fertilizers and pesticides has changed the river water quality;

(iii) Aquaculture might have also affected the water in Cu De River, where the area dedicated to aquaculture has reached 640 ha so far. Chemicals used in treating fishponds, spare food, scum, parasite, etc. have affected Cu De River basin. Besides, the utilization of saltwater for shrimp hatching has also affected coastal water quality in Lien Chieu; and,

(iv) Industrial waste sources is also very noticeable. Adjacent to Cu De River are three industrial parks and one industrial cluster. Of these, only one industrial park has a wastewater treatment system. Total industrial wastewater is estimated to be about 10,000 m^3/day. However, since the share of factories connected to the wastewater treatment system is estimated to be very low about twenty percents, it can be assumed that most wastewater are discharged directly into the Cu De River.

(c) **Phu Loc River:** Currently, wastewater discharge into the Phu Loc River is rather intricate:

(i) Waste from households along the two sides of the river is disposed of into the river, while dead duckweed in the upper reaches drift to the lower reaches;

(ii) In Thanh Khe District, the share of households with septic tanks is 93.7%, but the share of households that are connected to a waste treatment system is only 6.0%. So, the volume of wastewater discharged into the river must be high;

(iii) Wastewater from 12 manufacturing, trading, and service establishments engaged in textile, paper packing, hospitals, etc. plus wastewater from the Khanh Son dump site are discharge directly into the river basin. Total wastewater is estimated to be about 1,020 m^3/day;

(iv) Treated water from Phu Loc wastewater treatment plant at the preliminary level and discharged into the estuary of the Phu Loc River has a distinct foul odor which residents living around the area find hard to tolerate.

(3) Lake Water Quality

11.30 The total surface area of lakes and ponds is about 1.4 million m^3, and aquifer capacity is about 3.3 million m^3. Lakes and ponds control water levels and microclimates, create beautiful landscapes, serve as drainage systems, and improve water quality.

Thac Gian–Vinh Trung Lake (left) and 29-3 Lake Park (right) (Source: DaCRISS in Association with DONRE)

11.31 Main pollutants are organic substances (BOD_5, COD), nutrients (NH_4^+, NO_3^-), hazardous chemicals (oil) and microorganism (coliform). Organic substance pollution occurred in almost all lakes in the city. In comparison with QCVN 08:2008/BTNMT, BOD_5 levels exceeded permissible limits by 0.11 to 2.30 points and COD by 0,06 to 0.73 points, without any sign of decline.

11.32 Organic substance pollution happened in all lakes in the period 2005–2009. The concentration of $NH4^+$ was higher than QCVN 08:2008/BTNMT standards by 1 to 34 points on average, with the highest level registered at Rong Lake. The level of organic substance pollution in the lakes tended to increase compared with previous years' levels except for Green Lake, 29-3 Park Lake, and Thac Gian–Vinh Trung Lake.

Table 11.2.4 Lake Water Quality in Danang City, 2005–2009

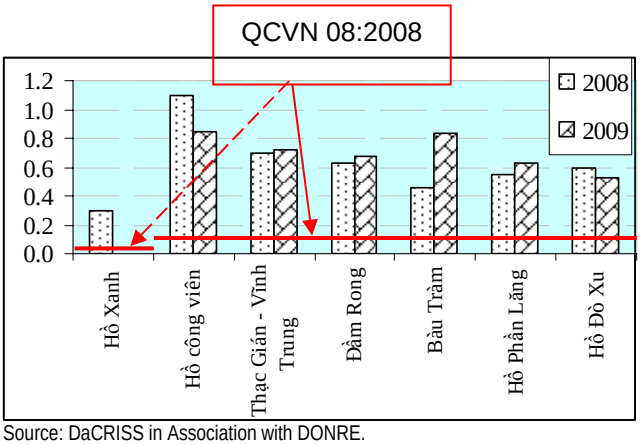
Monitoring Point	Year	Points Exceeding QCVN 08:2008/BTNMT						
		BOD_5	Oil	NH_4^+	NO_3^-	Coliform	Hg	Cd
1. 29/3 Park Lake	2005	0.97		15.20	0.26	0.19		
	2008	1.87	10.00	0.42	1.07	0.05	6.56	-
	2009	1.20	7.50	0.03	0.33	-	0.92	-
2. Thac Gian-Vinh Trung Lake	2005	1.10	-	9.16	-	-		
	2008	1.12	6.00	10.42	0.47	809.56	0.41	1.05
	2009	0.23	6.25	2.74	0.36	1.85	-	0.92
3. Rong Pond	2005	1.07		23.20	-	0.23		
	2008	1.48	5.31	14.49	0.77	77.86	-	-
	2009	2.30	5.75	35.95	0.43	26.70	-	2.31
4. Tram Pool	2005	0.70		16.92	0.47	-		-
	2008	1.32	3.63	0.26	0.75	0.42	1.15	0.28
	2009	1.13	7.38	1.16	0.25	8.48	0.97	0.94
5. Phan Lang Lake	2008	0.40	4.50	3.66	0.34	-	0.24	0.12
	2009	0.23	5.33	10.63	0.35	1.37	-	0.10
6. Do Xu Lake	2008	1.10	5.00	7.19	0.33	90.23	0.76	-
	2009	1.82	4.25	20.75	0.20	-	0.29	0.51
7. Green Lake (*)	2005			6,48	1,61			

	2008	0,11	14,00	22,16	-	-	-	-
	2009	0,83	kph	-	-	-	-	-

Source: DaCRISS in association with DONRE
Note: ( ): do not have monitored data
(-): not exceed QCVN 08:2008/BTNMT
(*) The monitoring points at Green lake was compared with QCVN 08:2008/BTNMT – National technical standard on surface water quality level A2 – Serving for running water supply but applying suitable treatment technology.
The remaining monitoring points were compared with QCVN 08:2008/BTNMT – National technical standard on surface water quality level B1 – Serving for irrigation purpose or other purposes.

11.33 Oil pollution was rather high and occurred in almost all the lakes since 2005, except for Green Lake. Oil content in lake water exceeded the standards by up to 14 points, showing an increasing trend in some lakes. There are only two lakes where oil content decreased compared with the 2008 levels but the decrease was not noticeable.

Figure 11.2.8 Oil Content in Lake Water



Source: DaCRISS in Association with DONRE.

11.34 In 2005–2009, microorganism pollution occurred frequently and at high levels in almost all the lakes, except for Green Lake. The level of coliform exceeded permissible levels by 0.05–809.56 points, with the highest at Thac Gian–Vinh Trung Lake in 2008. In 2009, microorganism pollution declined. Lakes in Danang City were polluted with heavy metals, such as Hg and Cd, except for Green Lake. In 2008, 29/3 Park Lake had Hg content exceeding allowable levels by 6.56 points.

11.35 The main causes of pollution are listed below.

(i) The wastewater treatment system was not put into operation, lakes in urban areas still receive domestic, industrial and service wastewater;

(ii) Awareness on the need for environmental protection by residents near lakes and ponds is still limited, e.g., discharging waste into and disposing of animal corpses in lakes and ponds;

(iii) Some lakes dot not have drainage pipes, resulting in stagnant water; and,

(iv) Discharging solid waste into Green Lake before 2005 affected its water quality.

11.36 Lake management was devolved in Danang City in 2005. Temporary solutions were also implemented such as cleanups, duckweed gathering, dredging, installation of barriers, and biological substance spray, etc. An integrated and sustainable management solution was not taken into consideration at that time. However, the PIIP project planned to improve the situation.

(4) Groundwater Quality

11.37 There are less potential groundwater sources in Danang. Groundwater quality varies much in the area. Some places have sufficient and potable water, while others don't have. There are areas where groundwater is salty and contaminated. Groundwater pollution has become a major problem in Danang City. The eight monitoring points (G1 to G8,) in the period 2005–2009 showed that the most common pollutants are microorganisms. All the monitored wells whose water is used for eating and drinking purposes had higher levels of coliform than that allowed by QCVN 09:2008/BTNMT (national technical standard on groundwater quality).

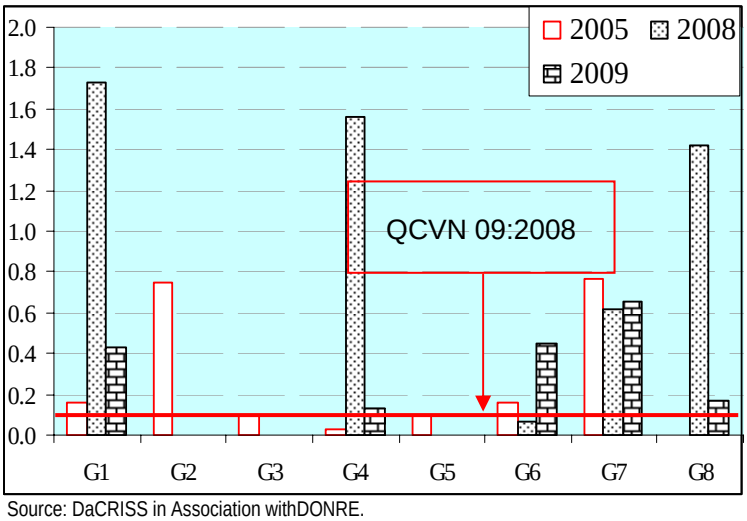
Table 11.2.5 Groundwater Quality, 2005–2009

Sampling Point	Year	Points Exceeding QCVN 09:2008/BTNMT					
		COD	SS	NH_4^+	NO_3^-	Coliform	Fe
1. An Thuong–Bac My An	2005	1,75	-	0,60	-	82,33	-
	2008		-	16,25	-	354	-
	2009		-	3,30	0,35	6,17	-
2. Tram Pond	2005	2,13	-	6,45	-	19,50	-
3. Tran Cao Van Street	2005	1,75	-	-	-	18,33	-
4. Hoa Quy	2005	1,38	-	-	0,23	112.33	-
	2008		-	14,6	3,45	215,67	-
	2009		-	0,35	-	-	-
5. Non Nuoc Trade Village	2005	0,50	-	-	-	14,33	-
6. Well In Dong Hoa–Hoa Chau	2005	4,38	-	0,55	-	84,83	-
	2008		-	-	-	172.33	-
	2009		-	3,50	0,55	3,17	-
7. Well In Khanh Son Dumping Site Region	2005	2,75	-	6,65	-	29,83	-
	2008		-	5,15	-	119,50	-
	2009		-	5,50	-	1,00	-
8. Well In Hoa Xuan Commune	2008		-	13,25	-	202,83	-
	2009		-	0,65	-	-	-

Source: DaCRISS in association with DONRE
Notes: ( ): not have monitored data; (-): not exceed permitted standard; QCVN 09:2008/BTNMT – National technical standard on groundwater.

11.38 Based on Table 11.2.5, all monitored wells in 2005 exceeded the QCVN 09:2008/BTNMT standards for coliform levels by 1.00 to 354 points and COD levels by 0.5 to 4.38 points in almost all monitoring points. In 2008 and 2009, all monitored wells had NH_4^+ content exceeding QCVN 09:2008/BTNMT standards by 0.35 to16.25 points.

Figure 11.2.9 NH4+ Pollution in Wells



Source: DaCRISS in Association withDONRE.

11.39 Water circulation was estimated as shown below table. Water consumption was estimated to 100 to 165 cubic m/day. treatment volume of waste water is estimated to 21,000m3/day. Therefore, less than 20% of consumpted water is treated. Total capacity was 73,000m3/day, Currently, only about 30% of treatment capacity is used.

Table 11.2.6 Estimated Water Circulation

Unit: 1000m3/day

Water Source	Capacity by Source	Actual Usage			Treatment	
		by Source	by Type		Capacity	Volume
Surface			Domestic and	60	68	17
Cau Do	90-155	60	Administrative,			
Son Tra	5	5	Service*ÇP			
Cu De	5	1	Industrial	13-40	5.1	2
Ground Water	Not necessary	7-	Medical	Included domestic	Unkonwn	2
Total	100-165	73-		73-	73-	21

*1 Not including Hotel and Resort along China Beach
*2 4 days retetion time
Source: DaCRISS in Association with DONRE.

11.40 Access to clean water is one of the most crucial issues in environmental management. As low as 65% of urban residents and 45% of rural residents are served with potable water. Based on HIS results, 66.8% of Danang households have access to piped water (see Table 11.2.7 and Figure 11.2.10), although the service ratios vary by district: Hai Chau has the highest rate (95.3%) and Hao Vang, the lowest (7.4%).

11.41 Based on HIS results, too, households with unsanitary toilets accounted for about 40% of the total survey respondents. In fact, only a small percentage of households (10.3%) have sanitary toilets (see Table 11.2.7). And, while the sewerage system covers 57.3% of Danang households, the coverage varies by district, with Hai Chau having the highest (88.4%) and Hoa Vang the lowest (2.6%). Service coverage in the three other highly urbanized districts falls within a range of 65% to 88%. Water contamination must be closely related to the slowness in developing sanitary facilities.

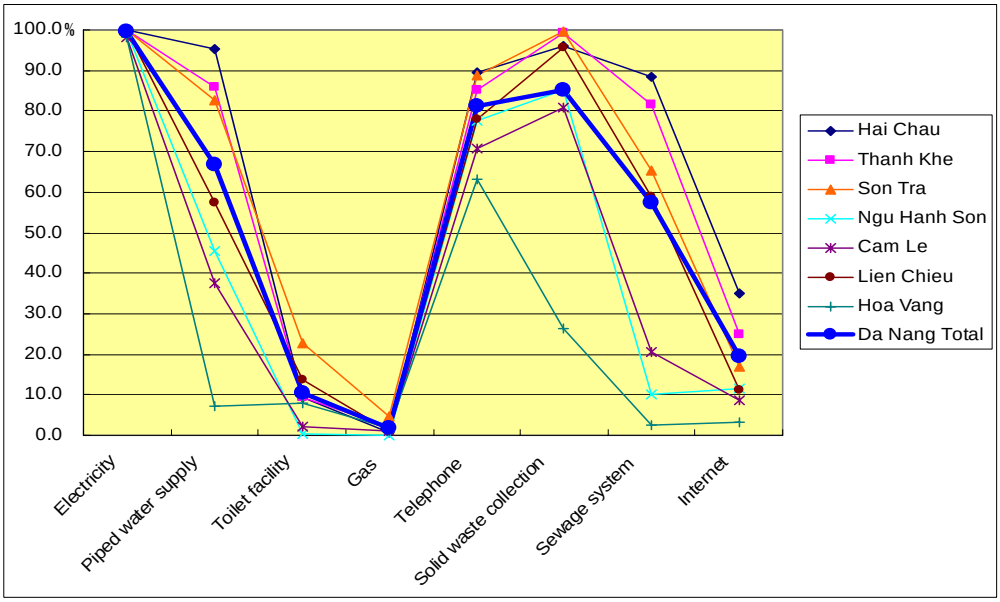
11.42 The future focus needs to be placed on mitigating contamination of both surface and groundwater, as the risks to people's health are very high, based on the "Danang Initial Risk Assessment," one of the outputs of the GEF–UNDP–IMO-funded PEMSEA. One of the most significant planning targets should thus be to provide all citizens with access to potable water.

Table 11.2.7 Household Access to Utilities and Other Services in Danang by District

District	Electricity	Piped Water Supply	Toilet Facility	Gas	Telephone	Solid Waste Collection	Sewerage System	Internet
1. Hai Chau	100.0	95.3	9.3	0.7	89.6	96.2	88.4	35.0
2. Thanh Khe	99.9	85.9	9.4	2.2	85.3	99.1	81.7	24.9
3. Son Tra	99.9	82.8	22.7	4.8	88.8	99.5	65.3	17.0
4. Ngu Hanh Son	99.7	45.7	0.3	0.0	77.8	85.3	10.0	11.7
5. Cam Le	98.1	37.5	2.2	1.0	70.9	81.0	20.5	8.7
6. Lien Chieu	100.0	57.2	13.7	1.0	77.8	95.7	59.0	11.1
7. Hoa Vang	98.3	7.4	8.0	1.9	63.2	26.3	2.6	3.1
8. Danang Total	99.5	66.8	10.3	1.8	81.2	85.3	57.3	19.4

Source: DaCRISS HIS, 2008.

Figure 11.2.10 Coverage of Utilities and Other Services in Danang by District



Source: DaCRISS HIS, 2008.

3) Air Pollution

11.43 Strong attention needs to be given to the environmental management of industrial activities. Exhaust fumes, such as CO, lead, NOx, and other metals, are discharged from iron and steel factories in Hoa Khanh, building materials factories in Lien Chieu, as well as from smelting furnaces, kilns, and/or ovens from other factories.

11.44 Environmental laws exist. In the past, 11 firms were punished for noise generation and dust emission; however, with a lack of effective control and management, enforcement is difficult.

11.45 In the period 2005–2009, there were seven monitoring points for air quality in residential areas and traffic points in Danang City. The monitored air quality in residential districts and at traffic points showed that dust and noise occurred almost at all points; how-

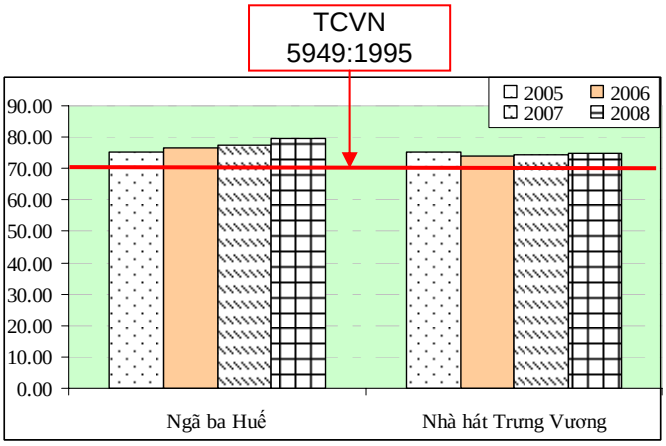
ever other pollutants, such as CO, NO_2, and SO_2, are not significant. No serious pollution was recorded at the foot of Hai Van pass and Son Tra peninsula based on TCVN 5937:2005 standards for air quality.

Dust Pollution due to Traffic (Source: DaCRISS in Association with DONRE.)

11.46 In residential districts and traffic points, there were three monitoring points where concentration of dust increased gradually: Ngo Quyen–Pham Van Dong intersection, Non Nuoc crossroad, and Trung Vuong theater exceeded the standards by 0.6 to 4.5 points.

11.47 In the period 2005–2009, noise levels were continuously recorded at Hue crossroad and Trung Vuong theater. Results are shown in Figure 11.2.11. At Nguyen Trai High School and Non Nuoc crossroad, noise levels in 2008 exceeded the TCVN 5949:1995 standards.

Figure 11.2.8 Noise Levels at Hue Crossroad and Trung Vuong Theater



Source: DaCRISS in Association withDONRE.

11.48 Monitoring results for residential districts and traffic points showed that pollutants, such as CO, NO2 and SO2, complied with TCVN 5937:2005 standards.

11.49 In 2005, Danang City monitored ambient air quality in six industrial parks/ clusters, namely Danang IP, Lien Chieu IP, Danang seafood services industrial park, Hoa Khanh IP, as well as Thanh Khe and Thanh Vinh industrial clusters. Results are shown in Table 11.2.8.

11.50 Based on the monitoring results, the levels of CO, NO_2, SO_2, and O_3 ranged from 0.01 to 2.00 mg/m^3 at the Danang IP; 0.01–3.00 mg/m^3 at the Lien Chieu IP; 0.004–2.00 mg/m^3 at the Danang seafood services industrial park; 0.01–2.00 mg/m^3 at the Thanh Khe 6 industrial cluster; 0.004–1.00 mg/m^3 at the Thanh Vinh industrial cluster; and 0.003–1.00 mg/m^3 at the Hoa Khanh IP and complied TCVN 5937:2005.

Table 11.2.8 Ambient Air Quality in Industrial Parks/Clusters, 2005

Sampling Point	Points Exceeding TCVN 5937:2005					
	CO	NO_2	SO_2	O_3	Dust	Noise
1. Danang IP	-	-	-	-	0.33	-
2. Lien Chieu IP	-	-	-	-	0.67	-
3. Danang Seafood Services Industrial Park	-	-	-	-	0.33	-
4. Thanh Khe 6 Industrial Cluster	-	-	-	-	0.33	-
5. Thanh Vinh Industrial Cluster	-	-	-	-	-	-
6. Hoa Khanh IP	-	-	-	-	-	-

Source: DaCRISS in association with DONRE
Note: (-): not exceeding the standards.

11.51 Dust pollution was observed in all monitored industrial parks/clusters except for Hoa Khanh and Thanh Khe 6. Monitoring results showed that dust concentrations in industrial parks/groups exceeded the TCVN 5949:1995 standards for dust in public places and residential areas by 0.33 to 0.67 points.

Traffic Jam in Danang (Source: DaCRISS in Association with DONRE)

11.52 In Hoa Hai, Ngu Hang Son District, the Non Nuc Traditional Fine Art Village, where over 400 firms producing stone products are located, needs to mitigate the environmental problems it has engendered, such as noise, dust, and wastewater mixed with chemicals. In Hoa Vang District, manual brick production causes air pollution due to the backward technologies being used for combustion and due to the many kilns used, of which there are 152.

11.53 Currently, about 443 thousand vehicles with internal combustion engine is registered in Danang City. The number of registered vehicles increases at a rate of 7.0% a year. The number of motorcycles alone increases by over 20,000 units a year and the traffic flow shows 775 units a day. Currently, there are some points in the city where traffic jams often occur at rush hours. The focus on improving ambient air quality should thus be placed on mitigating NOx and CO emissions of vehicles such as motorcycles, cars, and trucks. While this and replacing old types of engines will somehow lessen emission levels, the increasing number of vehicles may offset this reduction. A more environment-conscious transportation system needs to be introduced in Danang City in the future under the policy of pursuing the “Environmental City” concept. This should be the case to also ease the noise levels. Danang is very noisy due to the incessant use of horns by motorcycle and car drivers in general. The driving manner of motorists should be improved to reduce the unnecessary use of horns and decrease traffic accidents.

11.54 Besides transportation and industrial activities, construction activities also generated huge amounts of dust. In recent years, Danang City has built and developed its infrastructure, generating dust and noise in the process. Some construction activities which have caused dust and noise pollution are home building, road construction, sewerage repair, as well as transportation of soil, sand and other construction materials. Especially, the repair of bridges and street works that have not been finished, such as drainage system, communication system, street digging, and filling up, were unsanitary and caused serious dust pollution.

4) Soil Condition

11.55 Soil contamination was reported near Khanh Son and the agricultural lands in Hoa Khanh Hoa Hiep. Leachate from the old Khanh Son landfill and untreated wastewater from the Hoa Khanh Industrial Park are the suspected pollutants. And if soil is contaminated, water is too. The old land fill was merely covered by soil and waste stabilization, as well as leachate treatment, was not taken into account. Wastewater treatment in the industrial zone is also poor as mentioned in the section .

5) Solid Waste Management

11.56 It is reported that Danang City collects about 210,000 tons of solid waste a year, or 575 tons/day, which is 85% of the total solid waste generated by the people. Out of this, domestic waste shares 94%; industrial waste, 5%; and medical waste, 1%.

11.57 As to the composition of discharged solid waste, biodegradable waste or kitchen waste shares 77–80%, and recyclable wastes such as plastics, paper, glass, metal, etc., share 10%. These two types of solid waste account for approximately 90% of the total. This implies that a “zero-waste society” could be realized in Danang City, provided there is strong government facilitation and/or initiative of the “3R Movement,” or the recycling and reuse of resources and reduction of waste.

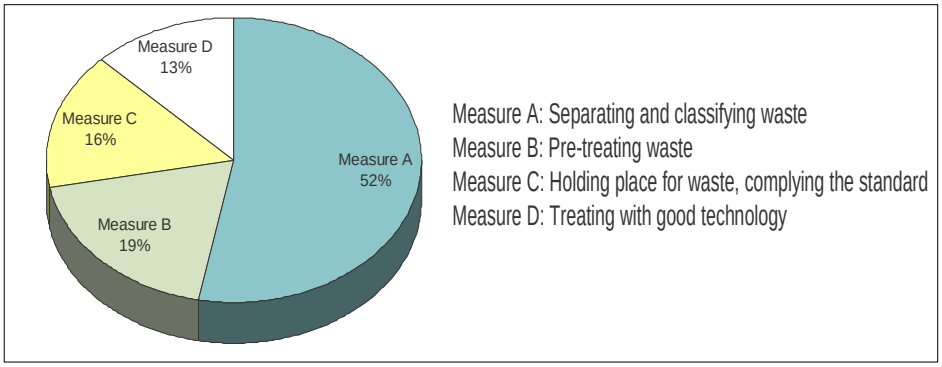
11.58 A proper management of hazardous solid wastes discharged from the industrial and medical sectors likewise needs to be urgently undertaken and should go together with strict enforcement. Although a regulation to this effect was enacted in 2005, there are neither appropriate management methods nor functional monitoring systems for hazardous industrial waste. Most factories located in industrial estates (KCNs) have contracted URENCO to treat their solid waste. However, this does not mean that the factories are no longer responsible for solid waste management. The discharge of harmless waste out of a factory’s property is the primary responsibility of the factory, not the government’s.

11.59 In this regard, all factory managers and technical staff should be made aware of the risks their factories pose on human health and the ecology. The most important is risk awareness, the opposite of which could adversely affect factory production, wreak untold damages on the environment, or cause death and sickness among the surrounding populace. Since the Vietnam-Canada Environment Program (VCEP) has long focused on building the administrative, technical, and analytical capacities of the staff of DONRE and other relevant departments to manage environmental problems in the industrial sector, such efforts should be further encouraged and facilitated to benefit all sectors of society.

11.60 About five to six tons of hospital wastes (harmful and life-threatening) are currently dumped into the Khanh Son dump site together with domestic waste. However, it is reported that only 30% of hospitals practice hazardous-waste disposal management, which means that most hospitals do not properly treat their wastes before disposal.

11.61 The focus must therefore be on the compliance with hazardous-waste management, including industrial and hospital waste. For industrial waste, all factories that discharge hazardous materials and URENCO, which is the contractor of industrial estates (KCNs), should use modern and appropriate waste treatment and detoxification processes. In general, while incineration is the favored method for hazardous-waste disposal, its social acceptability should be determined. Capacity building of all stakeholders should also be encouraged. At the same time, stricter legal enforcement should be done.

Figure 11.2.12 Hospital Waste Management Measures in Danang City



Source: Health Department, Danang City, 2007.

6) Natural Calamities, Droughts, and Flood

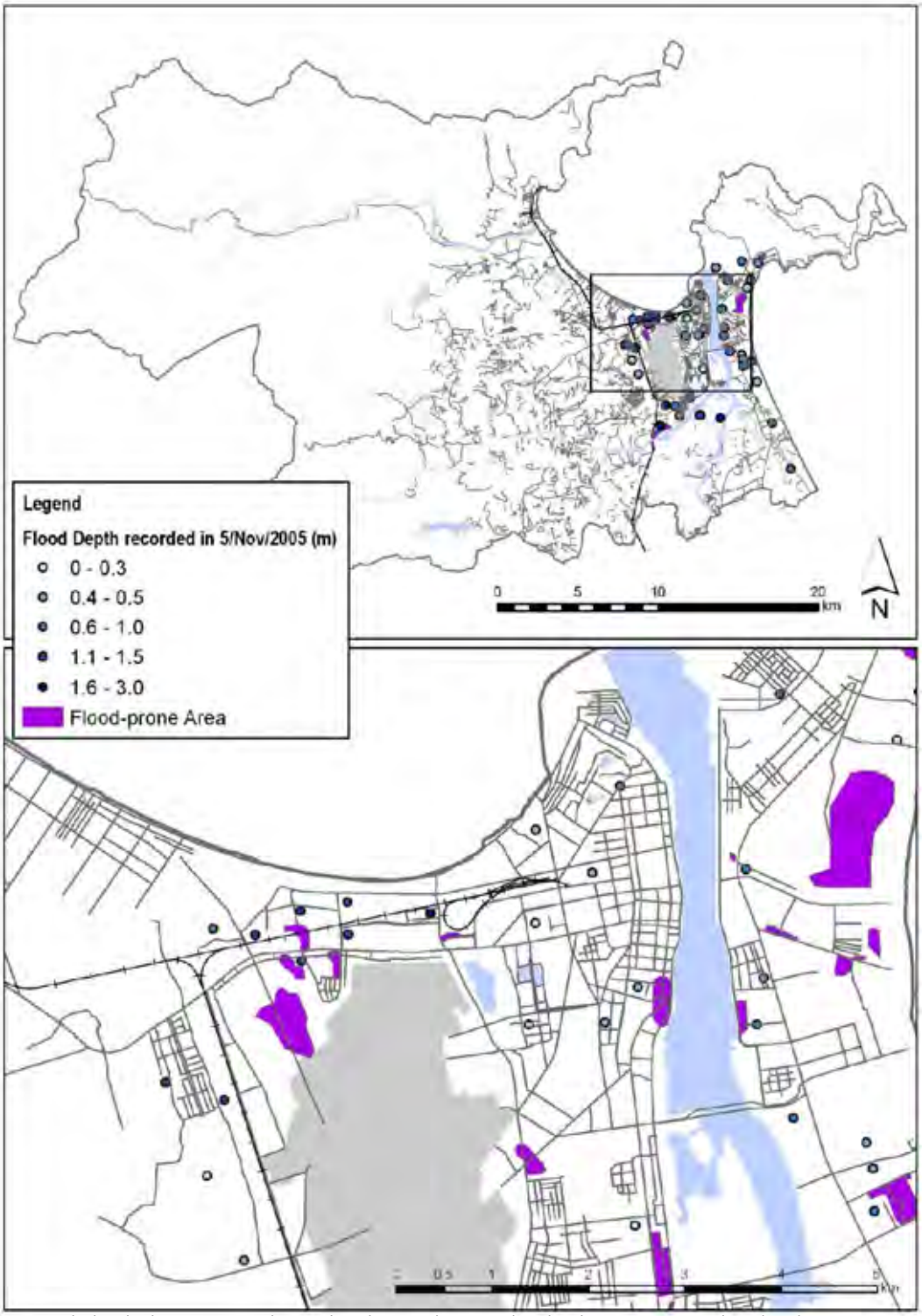
11.62 Danang City is vulnerable to typhoons and/or tropical low pressure. Between 2002 and 2006, typhoons hit Danang 10 times and tropical low pressure four times, and every time, the damages became more serious. On the other hand, droughts took place continuously. Rice crops were often affected by saltwater intrusion and extreme coldness due to climate changes.

11.63 Flooding is the most serious disaster in Danang City and its vicinity. In order to mitigate this disaster, the "Water Drainage and Environmental Sanitation Project" (WDESP) was implemented in 2006 to construct 37 km of sewerage pipeline and install 20 main sewerage systems. Through this project, damages from floods have considerably lessened, although there remain 156 flood-prone sites, 40 of which are road sections in Hai Chau District and in the central business district (CBD) (see Figure 11.2.13).

11.64 The ongoing WDESP also includes the development of a more expanded area with the installation of 17.4 km of gravity-fed collecting pipes, 18.8km of pressured drainage pipes, 84 diverging systems, 97 separate sewage wells, 18 underground pumping stations, and four sewage treatment stations.

11.65 A future focal issue is how to substantially decrease, if not eliminate, flooding in the city. Appropriate and durable drainage and sewerage systems should thus be adopted. WDESP is expected to further expand its coverage to remove the remaining flooding problems in the city. In association with such an infrastructure, a community-driven maintenance mechanism should be introduced to maintain the facilities in the long run.

Figure 11.2.13 Location of Flood-prone Sites in Danang City



Note: Worked out by the DaCRISS Study Team based on PIIP documents (2007) and DaCRISS GIS Database (2008).

11.3 People's Assessment of Current Environmental Conditions

11.66 Results of the Household Interview Survey (HIS), which was conducted in August 2008 by the DaCRISS Study Team to gather the opinions of residents on environmental and social conditions in Danang City, present a number of notable findings on people's views about the "Environmental City" concept. The HIS, which had 5,000 household-respondents, was designed in such a way as to make the results statistically significant.

11.67 In general, environmental issues have prime importance. Respondents from all districts except Hoa Vang considered the prevention of pollution as the highest priority for urban development, while the respondents of Hoa Vang considered natural disaster prevention as the highest priority, which is understandable given its topography. Following environmental issues, which also included flood and natural disaster prevention as the top priority, both "sanitary conditions improvement" and "landscape enhancement" ranked as second priorities. More than 60% of the respondents believed security in Danang City is good enough, and 73% perceived that security conditions have improved compared to the situation five years ago. It is therefore explicable that "safety/security improvement" would be of lesser importance among the respondents. Residents of districts where industrial estates are located, i.e., Lien Chieu and Cam Le, and those of Hoa Vang, where solid waste dump sites are located, were more concerned with pollution prevention.

Table 11.3.1 Security and Safety Conditions in Danang City

			Hai Chau	Thanh Khe	Son Tra	Ngu Hanh Son	Cam Le	Lien Chieu	Hoa Vang	Total
Current Security Situation	In the City in General (%)	Bad	3.2	6.1	2.1	1.7	3.8	4.2	3.4	3.7
		So-so	29.9	27.3	40.4	46.8	34.4	53.1	35.2	35.6
		Good	62.0	60.3	50.5	40.4	58.9	42.1	46.1	53.9
		Very good	4.9	6.2	7.0	11.0	2.9	0.6	15.4	6.7
		Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	In Your Community During the Day (%)	Bad	3.2	5.1	6.1	4.7	5.0	3.6	3.9	4.4
		So-so	33.9	22.4	29.3	40.4	19.9	33.9	26.9	29.1
		Good	59.1	67.3	58.2	43.9	63.6	57.1	61.1	60.1
		Very good	3.8	5.2	6.4	11.0	11.5	5.3	8.0	6.4
		Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	In Your Community At Night (%)	Bad	6.6	8.0	9.2	4.7	8.9	9.5	6.6	7.6
		So-so	42.5	32.5	30.9	42.7	36.1	50.5	29.1	37.2
		Good	48.7	55.3	56.0	41.6	46.7	35.0	56.6	50.2
		Very good	2.3	4.2	3.9	11.0	8.4	5.0	7.7	5.1
		Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Security Situation Compared to 5 Years Ago	In the City in General (%)	Worsened	6.0	9.5	5.4	4.4	5.0	7.8	3.4	6.3
		So-so	23.5	14.7	17.5	27.3	10.3	37.5	18.3	20.7
		Improved	70.5	75.8	77.0	68.3	84.7	54.7	78.4	73.0
		Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	In Your Community During the Day (%)	Worsened	3.6	5.3	7.7	9.9	6.5	5.0	4.1	5.5
		So-so	29.5	21.6	14.9	22.1	7.4	26.1	20.8	21.8
		Improved	66.8	73.1	77.4	68.0	86.1	69.0	75.1	72.8
		Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	In Your Community At Night (%)	Worsened	7.2	6.4	9.0	7.8	10.3	9.5	7.0	7.8
		So-so	31.6	25.0	15.3	23.3	10.3	38.9	20.0	24.6
		Improved	61.2	68.6	75.7	68.9	79.4	51.6	73.0	67.6
		Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: DaCRISS HIS, 2008.

Table 11.3.2 Disaster Vulnerability of Danang City

			Hai Chau	Thanh Khe	Son Tra	Ngu Hanh Son	Cam Le	Lien Chieu	Hoa Vang	Total
Typhoon (wind damage)	Property Damage (%)	Serious	7.9	11.0	29.2	35.7	34.2	33.5	52.9	24.7
		Slight	38.4	41.7	30.9	50.3	44.3	56.8	43.3	41.9
		None	53.7	47.4	39.8	14.0	21.5	9.7	3.8	33.4
	Injury (%)	Serious	0.2	0.0	0.5	0.9	0.7	0.4	0.7	0.4
		Slight	2.2	0.6	0.4	4.7	1.0	0.6	1.5	1.4
		None	97.7	99.4	99.1	94.4	98.3	99.0	97.8	98.2
	Mortality		0	11	152	0	8	0	40	211
Typhoon (storm surge)	Property Damage (%)	Serious	0.1	0.1	0.1	2.6	0.2	0.0	0.7	0.4
		Slight	1.4	0.0	0.7	9.6	0.2	0.0	1.0	1.3
		None	98.5	99.9	99.2	87.8	99.5	100.0	98.2	98.4
	Injury (%)	Serious	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
		Slight	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1
		None	99.8	100.0	100.0	99.7	100.0	100.0	100.0	99.9
	Mortality		0	0	61	0	0	0	8	69
Flood (gradual inundation)	Property Damage (%)	Serious	0.4	0.0	0.1	2.9	2.4	0.0	11.5	2.1
		Slight	1.9	0.3	0.7	3.8	3.1	0.0	13.8	3.1
		None	97.6	99.7	99.2	93.3	94.5	100.0	74.7	94.9
	Injury (%)	Serious	0.0	0.0	0.0	0.0	0.2	0.0	0.4	0.1
		Slight	0.2	0.0	0.0	0.0	0.2	0.2	1.5	0.3
		None	99.8	100.0	100.0	100.0	99.5	99.8	98.1	99.6
	Mortality		0	0	61	0	0	0	8	69
Flood (flash flood)	Property Damage (%)	Serious	0.2	0.0	0.0	0.0	0.2	0.2	5.9	0.9
		Slight	0.8	0.1	0.3	0.0	0.7	0.0	3.8	0.8
		None	99.0	99.9	99.7	100.0	99.0	99.8	90.3	98.3
	Injury (%)	Serious	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
		Slight	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.1
		None	100.0	100.0	100.0	100.0	100.0	100.0	98.8	99.8
	Mortality		0	0	61	0	0	0	8	69
Landslide	Property Damage (%)	Serious	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Slight	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0
		None	99.9	100.0	100.0	100.0	100.0	100.0	99.9	100.0
	Injury (%)	Serious	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Slight	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		None	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Mortality		5	0	60	0	0	0	12	77
Saline Intrusion	Property Damage (%)	Serious	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Slight	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
		None	100.0	100.0	100.0	100.0	100.0	100.0	99.9	100.0
	Injury (%)	Serious	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Slight	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		None	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Mortality		5	0	60	0	0	0	12	77
Fire	Property Damage (%)	Serious	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Slight	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0
		None	99.9	100.0	100.0	100.0	100.0	100.0	99.9	100.0
	Injury (%)	Serious	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Slight	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		None	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Mortality		0	0	60	0	0	0	12	72
Earthquake	Property Damage (%)	Serious	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Slight	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0
		None	99.9	100.0	100.0	100.0	100.0	100.0	99.9	100.0
	Injury (%)	Serious	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Slight	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		None	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Mortality		0	0	61	0	0	0	12	73
Other	Property Damage (%)	Serious	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Slight	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
		None	100.0	100.0	100.0	100.0	100.0	100.0	99.9	100.0
	Injury (%)	Serious	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Slight	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		None	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Mortality		5	0	59	0	5	0	8	77

Source: Danang HIS, 2008.

11.4 Existing Environmental Management Measures

11.68 A number of governmental and institutional tools on environmental management are available in Danang City. They are all subject to clarification, reinforcement, and/or revision so that they will meet future needs more effectively. These are:

(1) Danang City's Policy and Legal Regulations

11.69 Based on the Law of Environmental Protection, Danang City promulgated the Danang Environmental Protection Regulation in 2000, which is the legal basis for the environmental policies in the city. Meanwhile, the Danang environmental strategy and coastal management strategy was formulated up to 2010. In addition, in 2004, the Danang Action Plan 2006–2010 for Environmental Protection was formulated to catch up with rapid industrialization and urbanization. This action plan facilitated coordination between natural resources and social organizations, such as NGOs and CBOs, through five programs mobilizing communities and stakeholders. In general, the existing legal framework on environmental management in Danang covers the following areas:

(i) Regulations on Solid Waste Management (1997);

(ii) Industrial Pollution Management (2001–2005; and 2006–2010);

(iii) Regulations on Processing and Industrial Estates (2005);

(iv) Regulations on Environmental Sanitation in Coastal Tourism Zones (2001);

(v) Regulations on Business, Services, Landscaping, Publicly Preventive Activities in Beaches (2007), and Instructions on Tourist Area Development (2007); and

(vi) Regulations on Environmental Protection of Aquaculture and Fish Processing Industries.

(2) Monitoring and Reporting of Environmental Conditions

11.70 Since 1995, monitoring and reporting of environmental conditions have been done. In addition, monitoring and analytical capacities are being improved. In 2006, the Danang Integrated Environmental Monitoring Program was conducted in 35 water monitoring locations, 11 air monitoring sites, and three sea sedimentation stations, providing scientific data to seek an integrated development of these sectors. Although the importance of monitoring has been widely recognized, technical integration between the local and the national level is still weak, and the quality of facilities and equipment required for more accurate and frequent monitoring is still far from satisfactory.

11.71 The EPA (Environmental Pollution Agency) and DPC (District People's Committee) implemented periodic monitoring. EPA is in charge of large industrial parks, while the DPC is in charge of small factories. Target screening was done during the initial stage of EIA/EPC (Environmental Pollution Commitment). As shown in the previous section, monitoring results indicate a fluctuation of a trend. Or, may indicate that monitoring frequency is not enough. There are three centers which can conduct environmental measurement in Danang City.

11.72 The EPC (Environmental Protection Center) was established by DONRE to support the technical aspects of monitoring and inspection. A monitoring of the public area is basically done by the EPC. Measuring facilities and laboratory equipment were supplied by the Canadian government after 1996. So, some of them are outdated. The EPC has no capacity to conduct quality tests for all items indicated in the TCVN. For example, the testing of seven water quality indicators out of 30 needs to be subcontracted to other go-

vernmental agencies in Danang, while solid waste analysis was carried out by organizations in HCMC or Hanoi. Analyzed data was kept in hard copies, which makes it difficult to analyze the trend. Remote data entry and analysis using the computer are required for effective and smooth monitoring. Once some indicators do not meet the QCVN standards, the EPC reports to the operator and the EPA contacts the operator including providing advice to improve. Once the emission level extremely exceeds the standard, it is reported to the Inspection Department, which has the authority to punish offenders.

11.73 The Inspection Division in DONRE is authorized to receive complaints from the public and decide on the fines and penalties to be imposed on offending operators. The Inspection Division has conducted both scheduled and non-scheduled inspection. The latter is carried out in response to public complaints. In addition to the environment, they are in charge of inspecting water resources, mapping, land use, and mining. They have 10 staff in the division divided into two teams. The first team handles environment and mining, while the other is responsible for the rest water resources, mapping and landuse. The number of scheduled inspections is 60 for the first team and 27 for the second.

11.74 Team members are required to have a wide knowledge of the environment and mining as well as relevant laws and regulations. Since the speed of innovation in the environmental field is rapid and changing the laws and regulations is frequent, the members cannot cope with these changes. Furthermore, they felt needs for assigning personnel and training in the operating company also. These are thought to be one of the obstacles to enforcing environmental regulations and laws, besides the financial constraints.

(3) Dissemination of Environmental Information

11.75 This is an important part of the environmental management system simply because stakeholder participation is essential in promoting environmental awareness. Danang City conducted environmental promotion activities on different occasions from 1999 to 2006, as shown in Table 11.4.1. The following were also carried out:

(i) Green-clean-nice Sundays Movement (from 2004);

(ii) Community-based forums (Thuan Phuc, Tho Quang, Nam Duong, and villages); and

(iii) Special sessions on memorial days such as the International Environmental Day.

11.76 Since 1997, training on environmental management among government staff and relevant entities has been conducted to improve their knowledge and capacity on environmental protection in the industrial sector.

Table 11.4.1 Environmental Promotion Activities in Danang City between 1999 and 2006

Content	No. of Classes	Total No. of Trainees	Beneficiary
1. Organizing and teaching classes on environmental protection	52	1,774	Students, women, farmers, entities' staff and managers
2. Organizing and jointly discussing environmental protection	19	1,010	
3. Organizing seminars and workshops	9	376	

Source: DONRE, Danang City.

(4) Assessment of Environmental Impacts

11.77 This is an obligatory condition for project ratification or permission issuance, which was provided for in the Environmental Law in 1995. Since 2006, the conduct of an environmental impact assessment (EIA) has been required at three levels: central government,

city, and district. The quality of both EIA and the Appraisal Council is being improved, and a total of 116 EIA reports were ratified so far. An existing difficulty is the lack of EIA done on many tourist and business development projects which had been carried out before the Environmental Protection Law was passed. These projects are beyond the control of the law, even if some of them are environmentally problematic.

(5) Wastewater Collection Fee System

11.78 Since 2005, a wastewater collection fee has been imposed on Danang City residents, based on a central government instruction. 304 establishments are required to pay fees for treating industrial wastewater and 86 establishments are required to pay fees for treating domestic wastewater. Almost 90% of entities pay fees, which not only serves an economic end but also fulfills the "polluters-pay principle"; however, the system should be fairly and properly managed in close coordination with relevant public finance departments and industrial/ business entities.

(6) Legal Settlement of Environmental Disputes

11.79 Settlement of disputes over violations of environmental laws and regulations has been conducted by the respective jurisdictional agencies. From 1997 to 2007, a total of 895 industrial entities were inspected, 416 of which (46%) were found to have violated the law and 305 were fined. The total fine was VND604 million, which implies a fine of USD125 per case, which is very small. Typical reported violations include the following:

(i) Lack of environmental license;

(ii) Not taking measures as recommended in the DTM (EIA);

(iii) Noncompliance with legal requirements and standards; and,

(iv) Lack of periodic reports and others.

11.80 There are still many difficulties in carrying out inspections such as a lack of responsible staff and professional skills, as well as less coordination in the licensing process among authorities responsible for the environment and investment promotion. Many industrial projects ignore the procedure for getting a license, and the sanctions on violators are too weak to force factories to shift toward more environment-friendly practices.

(7) Formulation of Environmental Plans and Projects

11.81 The following plans were formulated to ensure environmental protection, namely the *Industrial Pollution Management Plan 2001–2005* and the *Hospital Waste Management Plan 2001–2005.* The former aimed to diminish industrial pollution and strengthen the city's capacity for industrial pollution management. The activities included:

(i) Quantitative assessment of industrial pollution in 138 factories;

(ii) Model projects on pollution prevention in two paper factories;

(iii) Monitoring of the industrial wastewater stream flows; and

(iv) Identification of polluted industrial sites.

11.82 Based on these activities, Danang City promulgated the *Danang Industrial Pollution Management 2006–2010* in 2007, which includes: (i) greening of factories, (ii) cleaner production, and (iii) training and education programs on industrial environmental management.

11.83 The latter plan addresses the improvement of hospital waste management as a whole. As it is, only 50% of public hospitals are equipped with wastewater treatment systems, which, however, have not been checked whether or not they are properly working. An administrative system that will monitor environmental management activities and provide appropriate guidelines to all hospitals urgently needs to be established.

11.84 The application of technology and science to environmental protection is expected to strengthen the capacity for scientific analysis and database building relevant to environmental management in both government agencies and academic institutions. In particular, information technology, such as GIS, and measurement systems needed in environmental assessment are expected to meet the prevailing conditions.

11.5 International Cooperation Projects

(a) **Vietnam-Canada Environmental Project (VCEP):** This project focuses mainly on human resource development, aiming to enhance the environmental analytical skills of relevant authorities and entities. The improvement of industrial pollution management is also one of the project's ultimate goals. VCEP I and II were conducted during the period between 1996 and 2005 and VCEP III was scheduled to start in 2008 with a five-year program lasting till 2013;

(b) **Water Drainage and Environmental Sanitation Project (WDESP):** This project aimed at the improvement of the drainage and solid waste management systems and included extensive construction projects and a new dump site. This project, which was carried out in 1999–2007, amounted to about USD41.05 million in the form of a World Bank loan and grants from Australia, Denmark, and Finland;

(c) **Danang Coastal Management Project (QLTHVB project)**: This project included the pilot project carried out by PEMSEA in 2000–2007 which consisted of 14 components, the major ones of which are listed below. The project formulated basic policies and plans, as well as developed or improved institutions, thereby helping the city improve the knowledge, skills, and methods of monitoring, risk analysis, and integrated information management.

(i) Workshop on environmental recording;

(ii) Formulation of strategies for Danang;

(iii) Increase in community's awareness;

(iv) Development of an information management system;

(v) Assessment of risks to Danang's coast;

(vi) Environmental investment;

(vii) Identification of coastal zone for common usage;

(viii) Reform of regulations on coastal management; and

(ix) Development of an integrated environmental monitoring program.

(d) **Donor Activities:** Support for environmental protection and harmonized sustainable development are still limited. Although much effort has been made to improve the city's sanitary conditions, a comprehensive system for effective urban environmental management remains to be established. The total system requires financial, legal, and institutional mechanisms, together with human resource capacity enhancement. Environmental issues are not limited to those on pollution control and disaster management, but should include the global concern for creating low-carbon societies wherein there is much lesser CO_2 emission. Donors and/or industrialized countries may facilitate this type of contribution through CDM (Clean Development Mechanism) in the future.

11.6 Institutional Aspect of Environmental Management

11.85 Environmental management, infrastructure planning, and institutional arrangement are closely linked, as shown by the experiences of many large and medium-size cities around the world. Experience also suggests that the institutional matter is not an easy issue to deal with.

11.86 Apart from Japan (JICA and JBIC), other countries and institutions which have supported Danang through ODA initiatives include the World Bank, Australia, the Netherlands, and recently the ADB and Germany. ODA projects besides DaCRISS and the recently completed port rehabilitation project include the PIIP supported by the World Bank and the water resource project financed by the ADB.

11.87 The institutional situation in Danang City can be characterized as follows:

(a) **Recent Transfer of Tasks, Duties, and Enterprises**

(i) Management of URENCO (solid waste management) has been under DONRE's control, while drainage services remain with a company under the DOT;

(ii) Transfer of land-use administration from DONRE to other offices or to specific bodies under DONRE;

(iii) Transfer of 50% of DOT staff to other offices in 2008;

(iv) Department of Fisheries and Forests was absorbed by DARD; and

(v) Transfer of water resources tasks from DARD to DONRE (this occurred several years ago following the creation of MONRE at the national level).

(b) **Planned Changes**

(i) Equitization of the DWSC in 2009;

(ii) Equitization of URENCO in 2009; and

(iii) Possible transfer of drainage services to DOC (date has not been determined yet).

11.88 Many departments have: (i) one administrative body composed of divisions with a rather limited staff dedicated to administrative and regulatory work, and (ii) technical bodies, which are often enterprises with the status of subsidiaries, laboratories, institutes, etc. Presumably, this structure enables reorganization, such as the transfer of the department's responsibilities to technical bodies.

11.89 While the institutional review will be complemented in the next months, at the moment, departmental responsibility over some tasks is far from being fully clear to the DaCRISS Study Team. Below are some examples.

(a) **Protection of Flora and Fauna Biodiversity and Marine Areas:** In practice, these tasks are under DARD's mandate, but it should also partially be under DONRE.

(b) **Sharing of Responsibility between DONRE and DARD for Water Resource Planning and Management:** In rural areas, DARD has authority over the use of water resources. Meanwhile, DONRE has no monitoring stations to ensure water quality, a problem which is common in rural areas all over Vietnam, following the creation of MONRE several years ago. Another department whose role should be delineated vis-à-vis DARD and DONRE is the Department of Trade which is responsible for hydropower facilities (i.e., dams).

(c) **Risk Prevention and Management:** Steering committees have been created to oversee petroleum safety or floods and storms mitigation; but the roles of these committees need further clarification.

11.90 The institutional trend in Danang is clearly oriented toward the corporatization or equitization of infrastructures and environment companies. This follows the global trend of providing economically efficient public services. Therefore, the Danang People's Committee needs to shift its function from being a public service provider to being a manager/controller of public services (considering the currently enhanced Vietnamese policy to facilitate a public–private partnership (PPP) scheme for infrastructure development.).

11.91 The changes to the institutional setup are ongoing. The urban development master plan will confirm or modify the existing institutional arrangements, for instance that for the drainage sector which apparently does not follow an integrated approach to urban water management. Authorities do not consider the present arrangement as definitive and the inputs of DaCRISS will help identify the suitable options in this regard.

11.92 As expected, the question of tariff remains critical since water rates as well as drainage and solid waste service fees are considered low and inadequate to enable the companies to recover their investments. Moreover, the decision of changing the tariffs/fees remains a political issue and rests with the People's Committee, and not an issue of commercial and/or social viability.

11.93 Today, the city of Danang clearly lacks planning tools. Moreover, most of the existing plans either have a planning horizon of up to 2010 only or do not feature a spatial approach. There is no general long-term master plan for the environment in line with the long-term socioeconomic development of Danang City. At the level of the companies involved in pollution prevention or water resources management, namely the DWSC, URENCO, and the Transport Management and Drainage Company, there is no business plan to make them economically sustainable.

11.94 Environmental management and infrastructure development in Danang and its neighboring provinces are carried out independently. Some interprovincial initiatives have been done under the authority of the central government such as the creation of the Vu Gia Thu Bon Management Board and the linking of Danang, Quang Nam, and Kon Tum provinces. But the exact tasks and influence of these initiatives need to be further clarified by the DaCRISS Study Team. Again, the sharing of responsibilities between MONRE and MARD, as well as their affiliated departments at the provincial level, remains unclear.

12 PARKS, GREEN SPACE, AND LANDSCAPE

12.1 Overview

12.1 The situation of parks, green spaces, and landscape in Danang City can be summarized as follows:

(i) The DaCRISS HIS showed that while only 78.8% of all respondents have access to parks and green spaces within short distances, the inner core areas, such as Hai Chau and Thanh Khe, and some fringe areas, such as Son Tra and Cam Le, tend to have poor access to parks and green spaces;

(ii) For residents of Lien Chieu and Hoa Vang air pollution is an issue, which has to do with the existence of industrial zones in these areas; and

(iii) In the people's assessment of the landscape elements in the city, the results showed that more than 70% (in some cases, 90%) agreed that some landscape elements, especially the electric wires, sidewalk parking, and advertising billboards in urban areas, have a negative impact. This suggests that the people felt these eyesores should be removed to create a better landscape. The people favored symbolic landscapes and landmarks, such as the Han River Bridge, Ba Na Mountain, and Son Tra Peninsula.

12.2 Situation Analysis

12.2 Parks and green space are one of the necessities of good living. Table 12.2.1 and figures 12.2.1–12.2..2 show the results of the DaCRISS HIS component on parks and green space. While only 78.8% of all respondents have access to parks and green space within a short distance, more than 80% of people feel that access to parks and green space is important, indicating a supply and demand gap. It should be noted that inner core areas, such as Hai Chau and Thanh Khe, and some fringe areas, such as Son Tra and Cam Le, tended to have poor access to parks and green space, while people in other areas, such as Ngu Hanh Son, wanted the facilities inside to be improved. One important point, though, is that safety is rather a satisfactory aspect, which is crucial as people assume that the number one function of parks and green space is as play areas for children.

12.3 On the other hand, air pollution is an issue among the people in Lien Chieu and Hoa Vang, which is most likely due to the existence of industrial zones in these areas. Danang is one of the five cities/provinces in central Vietnam where ambient environment quality has been monitored since 1995 as part of the National Environmental Monitoring Program. According to this program, there are relatively high concentrations of particulates and high noise levels in four monitoring stations in Danang City, three of which are in Lien Chieu.

12.4 Tables 12.2.2 show the people's assessment of the landscape elements in Danang City. The remarkable result is that more than 70%, in some cases 90%, of people agreed that these elements[1] have a negative impact on the landscape, especially electric wires, sidewalk parking, and advertising billboards in urban areas. This suggests that the people felt these eyesores should be removed to create a better landscape. The people favored symbolic landscapes and landmarks, such as the Han River Bridge, Ba Na Mountain, and Son Tra Peninsula. For lower-ranking landscape elements, there is little difference between favorite and least favorite landscapes.

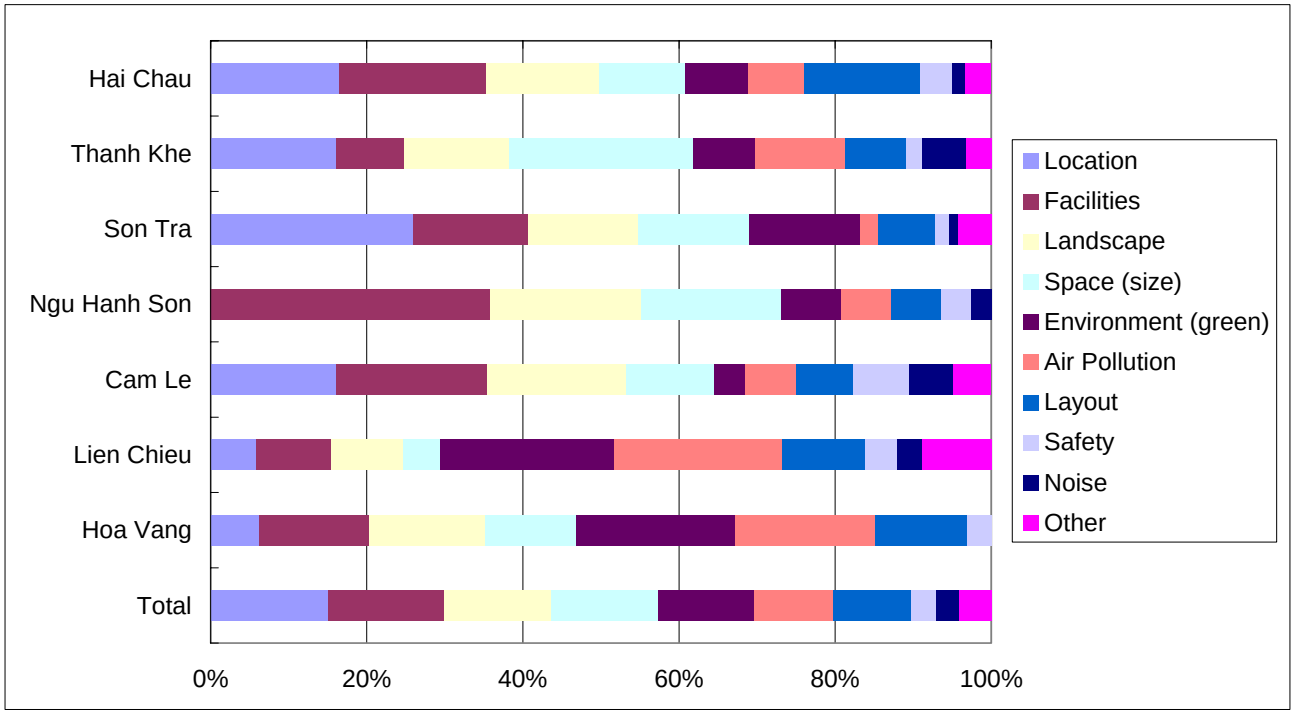
[1] Electric wires, sidewalk parking, advertising billboards in urban and suburban areas, building design, and overscale buildings.

Table 12.2.1 People's Assessment of Parks and Green Space in Danang by District

			Hai Chau	Thanh Khe	Son Tra	Ngu Hanh Son	Cam Le	Lien Chieu	Hoa Vang	Total
Availability of Parks and Green Space in Neighborhood (%)	Yes	Within walking distance	17.6	15.0	14.6	39.5	1.0	14.7	1.0	14.1
		Within a reached distance	12.3	5.4	7.4	15.4	0.5	6.3	0.3	7.1
		No	70.1	79.6	78.0	45.1	98.6	79.0	98.7	78.8
Importance of Access to Park and Green Space (% of Yes)		Yes	89.3	78.2	75.8	100.0	67.5	83.8	77.8	81.7
Satisfaction with Parks (%)		Dissatisfied	16.0	18.0	24.8	11.3	14.9	27.8	9.4	17.7
		So-so	56.1	47.8	38.1	43.3	62.4	55.8	49.0	50.3
		Satisfied	27.8	34.2	37.1	45.3	22.8	16.4	41.6	32.0
Reason for Dissatisfaction (%)		Location	16.4	16.0	25.9	0.0	16.1	5.8	6.3	15.1
		Facilities	18.9	8.8	14.7	35.9	19.4	9.6	14.1	14.8
		Landscape	14.4	13.4	14.2	19.2	17.7	9.2	14.8	13.8
		Space (size)	11.1	23.5	14.2	17.9	11.3	4.8	11.7	13.7
		Environment (green)	8.1	8.0	14.2	7.7	4.0	22.3	20.3	12.3
		Air pollution	7.1	11.5	2.4	6.4	6.5	21.6	18.0	10.1
		Layout	14.9	7.8	7.2	6.4	7.3	10.6	11.7	9.9
		Safety	4.0	2.1	1.9	3.8	7.3	4.1	3.1	3.3
		Noise	1.8	5.6	1.1	2.6	5.6	3.1	0.0	2.8
		Other	3.3	3.2	4.3	0.0	4.8	8.9	0.0	4.1
Needed Function of Parks / Garden Spaces (%)		Play area for children	25.0	26.8	29.7	37.1	31.9	28.2	26.5	28.0
		Greenery (trees, plants, flowers)	17.2	18.6	18.9	5.7	22.5	18.0	25.5	18.6
		Rest area	16.7	16.6	18.3	23.3	17.5	21.9	17.3	18.1
		Exercise/sports area	17.6	20.9	17.9	16.4	13.3	13.7	9.6	16.4
		Walking area	14.7	9.7	8.5	12.5	5.3	10.3	9.7	10.6
		Shelter against disaster	4.1	3.5	2.1	1.6	5.5	3.0	7.5	4.0
		Gathering area	4.4	3.4	3.9	3.5	2.5	4.0	3.6	3.7
		Other	0.3	0.6	0.7	0.0	1.6	1.0	0.2	0.6
Needed Facilities of Parks / Garden Spaces (%)		Playground for children	19.7	21.8	27.2	33.3	33.9	23.2	19.1	23.7
		Footpaths	17.3	18.9	22.4	27.2	11.2	20.7	14.0	18.5
		Benches	10.3	19.4	17.3	11.9	10.0	7.8	14.4	13.6
		Space for gathering	12.5	11.3	7.4	9.6	14.7	15.0	14.4	12.0
		Public Toilets	13.5	8.1	12.0	7.8	11.8	13.8	12.4	11.5
		Lighting	13.1	11.6	9.6	7.8	7.9	11.7	10.6	11.0
		Bulletin boards for public information	10.4	6.5	2.1	0.4	8.9	3.7	13.9	7.3
		Kiosks (vendors)	3.1	1.3	0.4	0.6	0.6	3.6	1.0	1.7
		Other	0.2	0.9	1.6	1.3	1.0	0.5	0.2	0.7
Expected Frequency of Using Parks for Main Purpose (%)	Rest (%)	Daily	16.6	11.1	34.7	43.8	23.1	38.4	1.0	21.0
		2-3 times/week	20.9	14.1	13.8	22.5	19.3	15.0	4.8	15.8
		Once a week	27.6	21.7	4.9	26.9	17.8	9.8	10.0	18.3
		Rarely/never	34.9	53.1	46.6	6.8	39.8	36.8	84.2	45.0
	Exercise (%)	Daily	39.9	34.4	48.9	34.6	29.9	40.7	2.7	34.2
		2-3 times/week	19.8	14.8	12.2	19.1	16.3	13.6	3.5	14.6
		Once a week	16.8	8.7	3.3	17.9	11.4	6.1	5.6	10.3
		Rarely/never	23.4	42.1	35.6	28.4	42.4	39.6	88.2	40.8
	Walk (%)	Daily	19.9	18.1	39.1	25.0	9.8	26.0	2.3	20.4
		2-3 times/week	25.9	15.3	14.1	27.5	22.0	14.3	2.9	17.7
		Once a week	28.3	12.3	6.8	28.7	22.3	8.7	10.4	17.1
		Rarely/never	25.8	54.3	40.0	18.8	45.8	51.1	84.4	44.8
	Play with Children (%)	Daily	3.3	11.1	23.0	15.7	3.4	7.7	0.2	8.8
		2-3 times/week	11.4	7.0	11.5	22.8	11.7	15.5	2.3	10.7
		Once a week	20.3	14.8	7.9	17.3	33.7	6.1	6.7	14.7
		Rarely/never	65.0	67.1	57.6	44.1	51.1	70.7	90.8	65.7
	Gather (%)	Daily	2.1	2.0	5.4	1.9	1.1	4.0	0.4	2.4
		2-3 times/week	5.7	3.7	5.6	4.0	4.5	8.0	1.2	4.7
		Once a week	20.2	14.8	18.5	20.4	29.5	9.1	4.0	16.2
		Rarely/never	72.0	79.5	70.5	73.8	64.8	78.9	94.4	76.7
	See performance (%)	Daily	0.2	0.8	2.3	0.6	0.4	4.2	0.0	1.1
		2-3 times/week	0.9	3.7	1.7	0.9	1.9	1.2	0.6	1.7
		Once a week	11.8	8.8	3.8	1.9	15.9	6.6	2.1	7.7
		Rarely/never	87.0	86.6	92.1	96.6	81.8	88.1	97.3	89.5

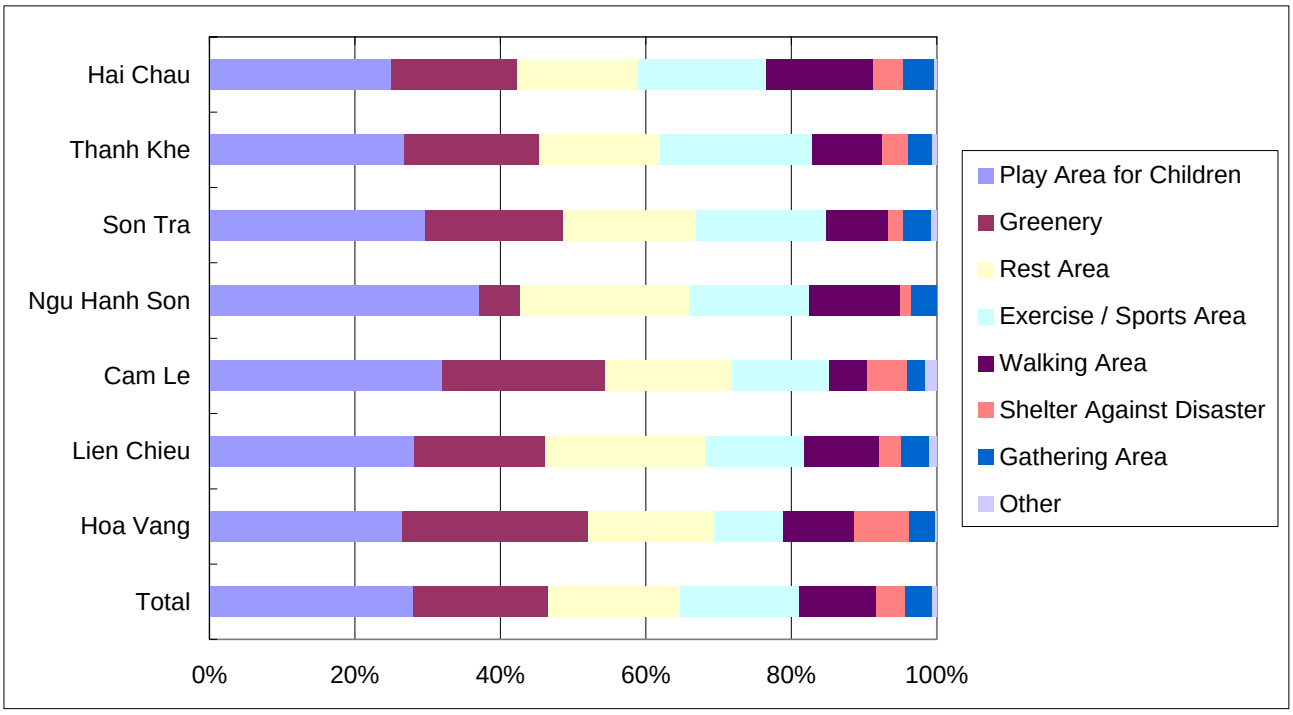
Source: DaCRISS HIS, 2008.

Figure 12.2.1 Reasons for People's Dissatisfaction with Parks and Green Space in Danang City by District, 2008



Source: DaCRISS HIS, 2008.

Figure 12.2.2 Desired Amenities in Parks and Green Space in Danang City by District, 2008



Source: DaCRISS HIS, 2008.

Table 12.2.2 People's Assessment of Landscape Elements in Danang City by District, 2008

			Hai Chau	Thanh Khe	Son Tra	Ngu Hanh Son	Cam Le	Lien Chieu	Hoa Vang	Total
Negative Impact of Landscape Elements (%)	Electric Wires (%)	Seriously	30.9	31.8	43.8	48.1	32.7	45.4	14.2	33.7
		Yes	68.5	67.0	54.7	50.4	63.9	54.2	85.2	65.1
		No	0.6	1.2	1.5	1.5	3.4	0.4	0.6	1.1
	Parking on Sidewalks (%)	Seriously	18.8	16.0	31.1	17.2	20.0	25.3	10.9	19.7
		Yes	78.2	79.0	67.7	82.2	76.8	73.2	88.3	77.8
		No	2.9	5.0	1.2	0.6	3.2	1.5	0.7	2.5
	Advertisement in Urban Areas (%)	Seriously	6.2	8.6	16.1	5.2	4.5	11.0	2.8	8.1
		Yes	85.1	84.5	69.1	88.4	88.9	78.2	95.4	83.7
		No	8.7	6.9	14.8	6.4	6.7	10.8	1.7	8.2
	Advertisement in Suburban Areas (%)	Seriously	1.5	4.1	10.2	0.6	0.8	6.6	0.5	3.7
		Yes	81.6	78.7	71.3	88.2	83.7	80.0	88.5	80.7
		No	17.0	17.2	18.5	11.2	15.5	13.5	11.0	15.6
	Design of Buildings (%)	Seriously	6.5	15.8	8.5	1.2	5.5	11.2	2.0	8.1
		Yes	75.0	67.2	65.9	73.3	62.9	65.5	77.2	69.0
		No	18.6	9.6	24.4	18.0	26.6	19.4	7.8	16.5
	Overscale Buildings (%)	Seriously	14.4	22.8	8.8	6.0	6.6	16.2	8.5	13.5
		Yes	71.8	69.6	65.7	62.8	67.9	63.8	82.8	70.0
		No	13.8	7.6	25.5	31.2	25.4	20.0	8.7	16.6
Landscape Objects (% of Most Favorite)	Han river bridge		12	17	16	17	18	18	23	16
	Ba Na		15	11	13	16	18	14	20	15
	Son Tra peninsula		11	13	27	17	15	9	2	13
	My Khe beach		13	12	16	9	9	5	4	11
	Non Nuoc beach		10	10	8	14	12	6	9	10
	Big C (Vinh Trung Plaza)		10	10	3	6	4	9	7	8
	Hai Van		4	6	4	3	4	7	6	5
	Metro		6	2	1	3	5	2	6	3
	Furama resort		5	2	3	4	3	6	2	3
	Xuan Thieu beach		3	5	3	1	2	6	4	3
	Hoang Anh Gai Lai Plaza		3	2	1	2	2	4	2	2
	Chi Lang Stadium		2	2	1	1	1	2	5	2
	Indochina riverside tower		3	1	1	1	1	3	1	2
	29 April Park		1	1	1	1	2	2	4	2
	Trung Vuong Theater		1	2	1	2	1	2	1	2
	People's Committee Building		1	2	1	0	0	3	1	1
	Tuy Loan Village		1	1	0	0	1	2	3	1
	Softtech office tower (Quang Trung)		1	0	0	0	0	2	0	1
Landscape Objects (% of Least Favorite)	Tuy Loan Village		13	11	11	10	15	15	12	12
	Chi Lang Stadium		10	10	12	8	14	8	11	10
	29 April Park		9	10	9	11	10	11	6	9
	Xuan Thieu beach		7	9	7	10	7	9	8	8
	Metro		7	9	9	2	7	7	4	7
	Softtech office tower (Quang Trung)		5	7	10	5	5	7	8	7
	Trung Vuong Theater		7	6	5	7	6	5	5	6
	Indochina riverside tower		5	6	7	5	3	7	6	6
	People's Committee Building		6	4	5	4	4	4	6	5
	Hai Van		4	4	5	7	5	5	7	5
	Hoang Anh Gai Lai Plaza		5	4	7	3	9	2	3	5
	Big C (Vinh Trung Plaza)		5	2	4	2	4	2	3	3
	Ba Na		4	6	2	6	0	2	2	3
	My Khe beach		2	2	1	2	4	5	7	3
	Non Nuoc beach		3	3	2	4	2	5	4	3
	Son Tra peninsula		4	2	1	3	1	2	7	3
	Furama resort		2	3	2	5	3	2	1	2
	Han river bridge		2	2	1	4	0	2	2	2

Source: DaCRISS HIS, 2008.

13 MUNICIPAL FINANCE

13.1 Overview

13.1 The characteristics of municipal finance in Danang City can be summarized as follows:

(i) State tax items that show notable growth in Danang are central SOEs and non-state sector. The amount of shared revenues, or shared tax revenues with central government, raises rapidly, while revenues with 100% entitlement, or revenues that the local government can retain and use, only slightly increase;

(ii) Among local budget expenditure items, recurrent expenditures show a rising trend;

(iii) In 2006, the total state revenue of Danang was VND6,490 billion, which is equivalent to VND8 million per capita and a state-revenue-to-GRDP ratio of approximately 50%. This ratio is higher than Hanoi's, Ho Chi Minh's, and the country's average. It would be difficult for Danang to sustain such trend given that import/export taxes will be suspended, land transaction revenue will decrease, and personal income taxes will diminish as a result of amendments to them;

(iv) In 2004–2006, the share of municipal revenue to nominal GDP value in Danang was 40%, which is relatively high;

(v) In 2006, the municipal budget per capita of Danang exceeded VND6 million, which confirmed the city's superior municipal budget;

(vi) Rent from land development is expected to be about VND4,700 billion (nearly USD298.5 million) until 2010;

(vii) On city bonds, the National Budget Law allows city governments to borrow from local banks a maximum of 30% of their development investment expenditure; and

(viii) There are three issues in public financial management for urban development in Danang, namely securing needed municipal revenue, balancing capital investments and recurrent expenditures, as well as managing O&M works.

13.2 Danang State Revenue and Municipal Account

1) Outline of the Public Finance in Danang

13.2 State tax items that show notable growth in Danang are central SOEs and non-state sector. The amount of shared revenues in percentage, or shared tax revenues with central government, raises rapidly, while revenues with 100% entitlement, or revenues that the local government can retain and use, do not increase so much. Among the items of local budget expenditures, recurrent expenditures show a rising trend to a large extent.

2) State Revenue

13.3 In 2006, the total state revenue of Danang was VND6,490 billion, which is equivalent to VND8 million per capita. The proportion of state revenue to GRDP was approximately 50% (Table 13.2.1). On the other hand, the total state revenue of Hanoi and HCM was VND39,553 billion and VND71,204 billion, respectively. These are equivalent to VND12 million and VND11 million per capita, respectively. The proportion of state revenue to GRDP was 43% for Hanoi and 37% for HCM.

13.4 Table 13.2.2 shows that compared with the country's average, the proportion of state revenue to GRDP in the three major cities of Danang, Hanoi, and Ho Chi Minh in 2006 was rather high, particularly in Danang.

Table 13.2.1 State Revenue and Municipal Account of Danang, 2004–2008

(Unit: VND mil.)

Item	2004	2005	2006	2007	2008 (Est.)
Nominal GDP	9,565,055	11,690,841	12,865,057	15,283,986	N/A
I. Total State Budget Revenue in Provincial Area	5,121,625	5,515,509	6,489,759	9,569,307	6,871,744
1. Domestic Revenue (Excluding Oil)	3,219,367	3,436,742	3,356,017	6,372,284	4,048,000
i. SOEs	421,587	574,488	653,170	727,315	970,000
Central SOEs	361,186	501,936	589,892	618,267	890,000
VAT	286,379	421,520	488,070		796,360
Corporate Income Tax	71,383	57,894	81,513		75,000
Domestic Sales Special Consumption Tax	1,452	18,657	17,219		16,500
Others	1,972	3,865	3,090		2,140
Local SOEs	60,401	72,552	63,278	109,048	80,000
VAT	34,455	52,053	40,921		63,150
Corporate Income Tax	18,359	19,340	21,042		15,500
Domestic Sales Special Consumption Tax	143	112	119		120
Others	7,444	1,047	1,196		1,230
ii. FDI	205,866	225,123	312,662	235,529	320,000
VAT	57,230	72,297	84,760		157,350
Corporate Income Tax	13,282	20,522	21,172		28,000
Lease from Land and Water Area	1,235	5,191			
Overseas Profit Transfer Tax					
Domestic Sales Special Consumption Tax	133,877	126,883	113,992		130,000
Others	242	230	92,738		4,650
iii. Non-State Sector	215,446	283,006	341,331	455,510	470,000
VAT	105,134	144,283	182,032		279,220
Corporate Income Tax	90,300	114,807	132,490		161,100
Domestic Sales Special Consumption Tax	5,359	5,970	6,087		6,400
Others	14,653	17,946	20,722		23,280
iv. Land/Housing	2,041,745	1,947,820	1,581,739	4,475,702	1,933,000
v. Individual Income Tax	20,297	42,412	28,799	60,274	45,000
vi. Registration Fees	60,128	59,717	66,836	132,874	90,000
vii. Gasoline/Oil Fees	105,029	82,537	105,780	110,284	110,000
viii. Fee/Charges	56,881	67,373	88,145	106,806	90,000
ix. Others	92,388	154,266	177,555		20,000
2. Oil Revenue					
3. Net Export-Import Revenue,	994,986	996,727	1,478,091	1,646,140	1,620,000
4. Grants		34,876	62,162	38,368	

Item	2004	2005	2006	2007	2008 (Est.)
5. Unbalanced Fees in Public Sectors not Managed by City	163,263	153,126	189,852	321,060	254,744
II. Local Budget Revenue	4,338,343	4,584,416	5,188,245	7,954,243	5,498,270
1. Decentralized Revenue	3,141,399	3,349,613	3,234,211	2,991,041	3,811,111
i. Revenue with 100% Entitlement	2,241,065	2,220,745	1,973,121	4,778,388	2,133,780
ii. Shared Revenue in Percentage	900,334	1,128,868	1,261,090	1,390,119	1,677,331
2. Transfers from Central Budget	289,672	152,761	298,383	234,854	242,881
3. Transfers from Provincial Budget			154,500		
4. Investment mobilization (Dept) for Infrastructure	525,000	600,000	1,080,000	0	800,000
5. Remainder of Last Year's Budget	169,341	127,339	73,353	526,821	
6. Undisbursed Expenditure of Last Year's Budget	49,668	166,700	250,284	664,633	149,000
7. Fees in Social Sectors not Managed by Local Gov't	163,263	153,126	189,852		254,744
8. Grants		34,876	62,162	38,368	
9. Others	49,668	166,701	95,784	526,821	389,534
III. Local Budget Expenditures	4,197,033	4,498,879	4,648,720	5,864,776	5,498,270
1. Capital Investment Expenditures	3,010,038	2,745,191	1,973,585	2,122,927	3,387,260
2. Recurrent Expenditures	643,203	882,907	1,142,804	1,315,359	1,185,317
3. Refund & Interest Payment of Loan from Local Finance	200,378	452,837	663,703	1,108,597	
4. Transfers to Financial Reserve Fund	1,000	1,000	6,000	25,000	5,000
5. National Target Programs Expenditure	17,693	19,808	32,881	38,157	38,400
6. Transfers from Central Budget to Nat'l Target Programs					4,100
7. Salary Reform Expenditure					237,738
8. Contingencies (Natural Disaster, New Policy)					136,581
9. Transfers to Next Year's Budget	166,700	250,284	664,871	937,362	
10. Expenditures from Unbalanced Fees	158,021	146,852	164876	317,374	254,744
11. Additional Budget for Subsectors					240,534
12. Others	0	0	0		8,596

Sources: DSO and Danang Statistical Yearbook, 2004
* Denotes an estimated value.

Table 13.2.2 State Revenue and GDP of Vietnam and Selected Cities, 2006

Area	GDP (VND bil.)	State Revenue (VND bil.)	State Revenue Per Capita (VND mil.	State Revenue/ GDP (%)
Danang	12,865	6,490	8.1	50.4
Hanoi	90,929	39,553	12.0	43.5
HCM	190,561	71,205	11.2	37.4
Whole of Vietnam	974,266	279,472	3.5	28.7

Source: Ministry of Finance.

13.5 Figure 13.2.1 illustrates the state tax–to–GDP ratios in APEC member-countries in 2004. The figure for Vietnam (approximately 20%) then was slightly higher than the average of those countries. Now, however, the figures for major Vietnamese cities (more than 30% in Table 13.2.2) are notably higher when compared to the 2004 figure.

13.6 With respect to the state revenue of Danang, it would appear difficult for Danang to sustain such a large portion of the state revenue given the following:

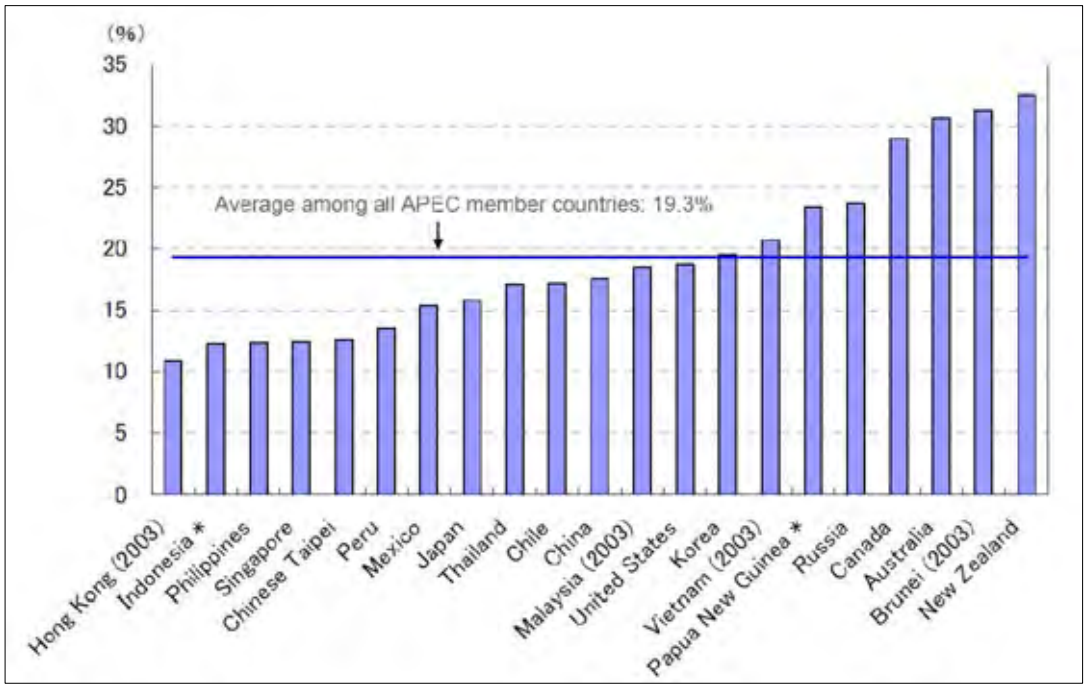
(i) Taxes from import/export will be suspended as per the WTO agreement;

(ii) Revenue from land transactions will surely decrease; and

(iii) Personal income tax (PIT), which was recently amended in 2009, will generate less revenue than before.

13.7 Consequently, unless Danang stimulates greater revenue from the production and service industries, for example, from corporate income tax and value-added tax (VAT), there will be no steady increase in state revenue.

Figure 13.2.1 State Revenue–to–GDP Ratios in Various Countries, 2004



Source: IMF Government Finance Statistics.

13.8 **Personal Income Tax:** New personal income taxes, amended by the National Assembly in 2008 and 2009, will be applied in the second half of 2009. The amendment provides for a VND160,000 deduction for every dependent family member. To estimate the total personal income tax for 2008 using the new taxes on 2008 HIS data incomes would only be VND1,732 million (Table 13.2.3). In 2007, the actual total was VND60,274 million. The amended tax system will therefore bring less state revenue. As large families are common in Vietnam, personal income after deductions leaves almost no taxable amount.

Table 13.2.3 Revenue from Personal Income Taxes in Danang City

Personal Income Tax	Total Revenue (VND mil.)
2008[1]	1,732
2007[2]	60,274

[1] Processed based on 2008 DaCRISS HIS results.
[2] From DOF document.

3) Land-related Revenue

13.9 Table 13.2.4 show the projected land development budget in Danang until 2010. Rent from land development alone is expected to be about VND4,700 billion (nearly USD298.5 million). Rent from the recovery and development of land varies depending on the kind of land converted and its location. For example, agricultural land is typically compensated at VND25,000 per square meter[1] and sold in peripheral districts such as Lien Chieu for an average of VND1.3 million per square meter. Reclaimed residential land in the same district is compensated at an average of VND700,000 per square meter.

13.10 Table 13.2.4 shows that most of the revenue raised from land (93%) is intended for reinvestment in further development and compensation payments. And, although a

[1] This varies greatly depending on which legislation the compensation payment was granted and the location of the recovered land.

significant proportion is allocated elsewhere, it is not clear how much of this (if any) is earmarked for recurrent expenditures on operation and maintenance. Evidently, however, only a small portion of revenue from land (2%) is from sustainable tax sources.

Table 13.2.4 Land-related Revenue and Expenditures in Danang City, 2004

Revenue Source	VND Billion	Percent of Total Revenue	Land-related Expenditure	VND Billion	Percent of Total Revenue
1. Allocation of Land	20,900	81.77	1. Compensation for Planned Projects	16,184	63.32
			Agricultural Land	1,452	5.68
			Non-agri'l Production Land	481	1.88
			Other Non-agricultural Land:	775	3.03
Residential Land:			Residential Land:		
Hai Chau District	5,273	20.63	Hai Chau District	3,955	15.47
Thanh Khe District	3,330	13.03	Thanh Khe District	2,220	8.69
Son Tra District	2,491	9.75	Son Tra District	1,744	6.82
Ngu Hanh Son District	3,056	11.96	Ngu Hanh Son District	1,646	6.44
Lien Chieu District	3,558	13.92	Lien Chieu District	1,916	7.50
Hoa Vang Province	3,192	12.49	Hoa Vang Province	1,995	7.81
2. Allocation of Land for Non-agricultural Production and Commercial/ Business Activities	4,000	15.65	2. Building Residential Areas, Infrastructure, Public, Cultural and Welfare Projects	7,500	29.34
3. Leasing Land for Non-agricultural Production & Business	160	0.63	3. Land Administration	5	0.02
4. Land Tax & Land Transfer Tax	500	1.96			
Total Revenue	25,560	100.00	Total Expenditure	23,689	100.00

Source: DPC 2004.

4) City Bonds

13.11 The National Budget Law restricts the borrowing amount in a fiscal year for the municipal budget; the city government is permitted to borrow a maximum of 30% of the development investment expenditure from local banks. Local governments can also legally issue province/city bonds.

13.12 Table 13.2.1 shows the borrowing trend in Danang City. The loans in 2004 and 2005 amounted to VND500–600 million, whereas the amount in 2006 was over VND1,000 million. Danang City appropriated more than VND1,000 million to pay off these debts. Danang has had no outstanding debts for 2007 to 2009, which indicates sound financial footing.

13.13 Although the SEDP mentioned the advantages of city bonds, Danang City does not intend to issue such bonds due to current surplus revenue.

13.3 Comparison of Municipal Financial Structure of Danang City and Other Cities

1) Ratio of Municipal Revenue to GDP

13.14 Table 13.3.1 and Figure 13.3.1 compare the nominal GDP values and municipal budget revenue among Danang, Hanoi, and Ho Chi Minh cities in 2004–2006. With regard to economic size, the scale of Danang's GDP was approximately one-seventh of Hanoi's and one-fifteenth of Ho Chi Minh City's at the time of settlement of accounts in 2006. Meanwhile, the share of municipal budget revenue to nominal GDP value in Danang was 40%—that of Hanoi and Ho Chi Minh City was 15% and 13%, respectively. The share to Danang's GDP was relatively high.

13.15 The Vietnamese tax system affects these figures. State taxes are shared between the central and municipal/provincial governments, varying from locality to locality. All taxes on imports/exports and oil, which represent significant amounts, are collected by the central government; therefore, the cities responsible for transacting these large amounts, such as Hanoi and Ho Chi Minh, cannot collect revenue from these sources.

13.16 In the context of Danang's urban development, maintaining a high ratio of municipal budget to GDP is an important aspect of revenue management.

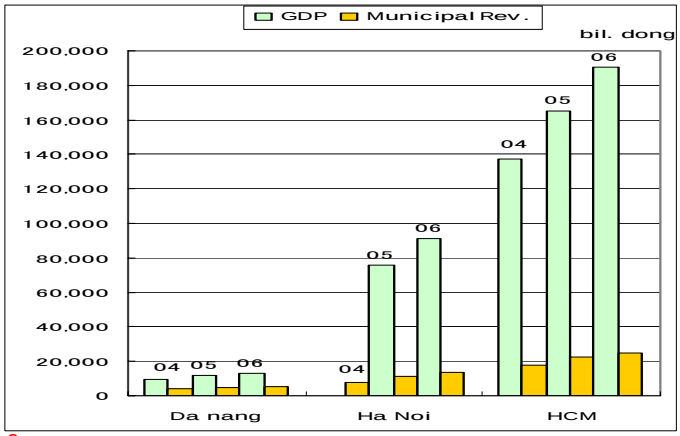
13.17 The 2007 municipal budget was VND7,954 million, which is equivalent to 52% of the GRDP (Table 13.3.1). This ratio has remained at a high level due to the substantial revenue arising out of the land-use right.

13.18 At the same time, the ratios for Hanoi and HCM were 14% and 13%, respectively. These two cities transferred a large portion of state revenue to the central government, retaining much less in their municipal budget. Danang, on the other hand, retained around 90% of state revenue. As Danang achieves greater economic development, this ratio will be readjusted by the central government, eventually coming closer to the ratios of Hanoi and HCM.

13.19 Elsewhere in the world, for example in the Japanese midsize coastal cities of Kitakyushu, Nagoya, and Kobe, the ratios of municipal revenue to GDP are less than 10%.

13.20 **Municipal Budget Per Capita:** Figure 13.3.2 indicates the municipal budget per capita in 2006. The figure for Danang was exceptionally high, exceeding VND6 million, whereas the figures for other cities remained around or below VND4 million. This confirms Danang's superior municipal budget compared to the other three cities.

Figure 13.3.1 GDP and Municipal Budget Selected Vietnamese Cities, 2004–2006



Source:

Table 13.3.1 GDP and Municipal Budget of Selected Cities

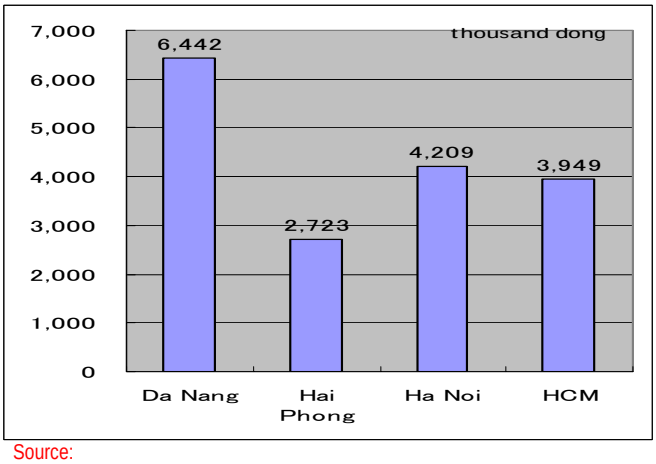
(VND Bil.)		2005	2006	2007
Danang	GDP	11,691	12,865	15,234
	Municipal budget	5,516	6,490	7,594
	Capital Investment Expenditures (C.I.E)	2,745	1,974	2123
	Budget/GDP (%)	39.2	40.3	52.0
	C.I.E / GDP (%)	23.5	15.3	13.9
Hanoi	GDP	76,006	90,929	
	Municipal budget	30,748	39,553	
	Capital Investment Expenditures (C.I.E)	4,819	5,898	
	Budget/GDP(%)	15.1%	15.2	
	C.I.E/ GDP (%)	6.3	6.5	
HCM	GDP	165,297	190,561	
	Municipal budget	61,860	71,205	
	Capital Investment Expenditures (C.I.E)	7,517	6718	
	Budget/GDP (%)	13.6	13.2	
	C.I.E / GDP (%)	4.5	3.5	

Source: GSO.

(VND Bil.)		2005	2006
Kita-kyusyu	GDP	638,000	631,300
	Municipal budget	92,160	89,020
	Capital Investment Expenditures (C.I.E)	34,670	33,420
	Budget/GDP (%)	14.4	14.1
	C.I.E / GDP (%)	3.0	2.8
Nagoya	GDP	2,207,000	2,225,000
	Municipal budget	170,300	174,600
	Capital Investment Expenditures (C.I.E)	18,000	21,670
	Budget/GDP (%)	7.7	7.8
	C.I.E / GDP (%)	0.8	1.0
Kobe	GDP	1,044,000	1,068,000
	Municipal budget	126,200	135,400
	Capital Investment Expenditures (C.I.E)	14,920	15,320
	Budget/GDP (%)	13.0	11.8
	C.I.E / GDP (%)	1.4	1.4

Source: Data of Japanese municipalities from Statistical Data Portal Site of Yokohama city.
(http://www.city.yokohama.jp/me/stat/daitoshi/new/): 1 JPY=177VND.

Figure 13.3.2 Municipal Budget per Capita of Selected Vietnamese Cities, 2006



Source:

2) Main Sources of Municipal Revenue

(1) Domestic Revenue Composition by Tax Type

13.21 Table 13.3.2 and Figure 13.3.3 break down the 2006 domestic revenue in four cities in Vietnam by type of tax in figures and percentages. Taxes on imports/exports and oil are excluded from this analysis because these taxes are not decentralized to the municipal budget. The data shows that the portion of taxes imposed on land in Danang was very high—close to half its total tax revenue.

13.22 When comparing Danang with Hai Phong, there is not much difference in their corporate income tax and VAT. However, due to the high amount of land tax in Danang, the total domestic revenue of Danang is larger than that of Hai Phong. In other words, Danang's budget relies on revenue from land, while that of Hai Phong owes much from VAT. Compared with the other three cities, Danang had the lowest corporate income tax.and individual income tax.

13.23 It cannot be emphasized enough that Danang will soon run out of land for assignment of the Land Use Right; therefore, its main revenue source will not generate as much revenue as before and will decline.

13.24 To date, most citizens are not required to pay individual income taxes owing to the low levels of income. In the current tax system, a person with a monthly income below VND5 million is exempt from income tax payments. The present portion of individual income tax to domestic revenue in Danang is less than 1%: this portion is expected to gradually increase, as in the case of the other three cities.

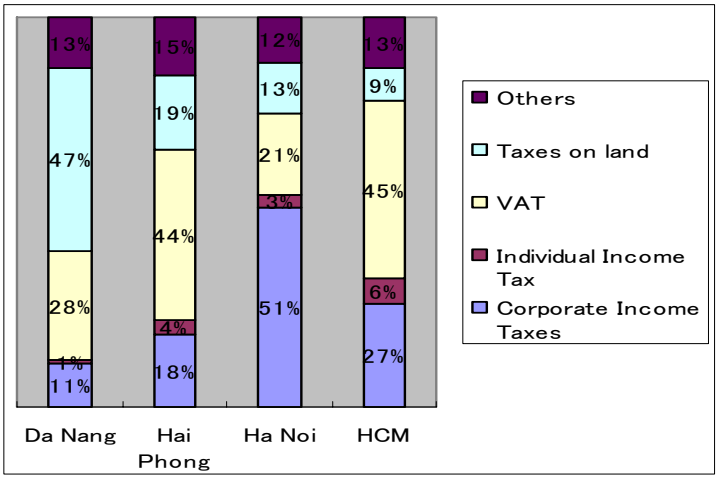
Table 13.3.2 Domestic Revenue of Major Vietnamese Cities by Type of Tax, 2006

(Unit: mil.VND)

Tax Type	Danang	Hai Phong	Hanoi	HCM
Corporate Income Tax	373,963	543,818	14,767,102	9,127,255
Individual Income Tax	28,799	114,172	966,529	2,227,138
VAT	933,200	1,289,824	6,069,301	15,551,978
Land Tax	1,581,739	571,734	3,721,432	3,024,306
Others	438,316	433,817	3,404,663	4,396,406
Total Domestic Revenue[1]	3,356,017	2,953,365	28,929,027	34,327,083

Source: MOF.
[1] Revenue from import/export is excluded because such is transferred to the central government, while a large share of other taxes is decentralized to the local governments.

Figure 13.3.3 Domestic Revenue of Major Vietnamese Cities by Type of Tax, 2006



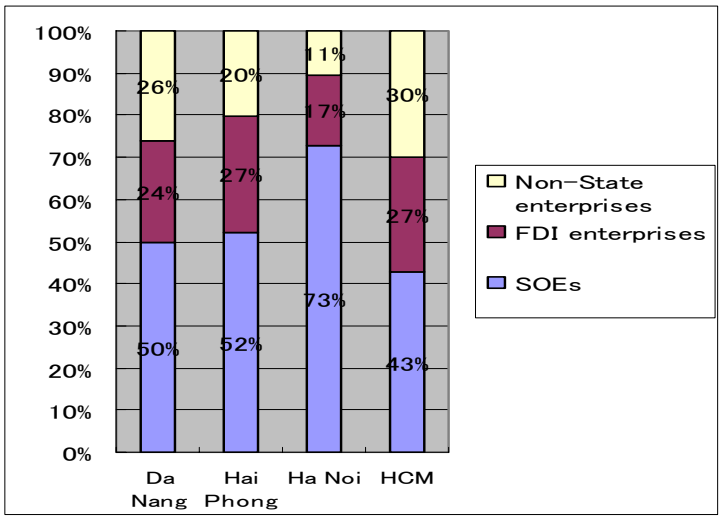
Source: MOF.

(2) Tax Composition by Source Sector

13.25 Figure 13.3.4 indicates the shares of SOEs, non-state enterprises, and FDIs in the total tax paid in 2006. Taxes include corporate income tax, VAT, and other fees/charges from respective sector companies.

13.26 The shares of Danang and Hai Phong are almost similar. In terms of economies of scale, it can be said that Danang's current scale is just a small version of Hai Phong's.

Figure 13.3.4 Tax Composition in Major Vietnamese Cities by Source Sector, 2006

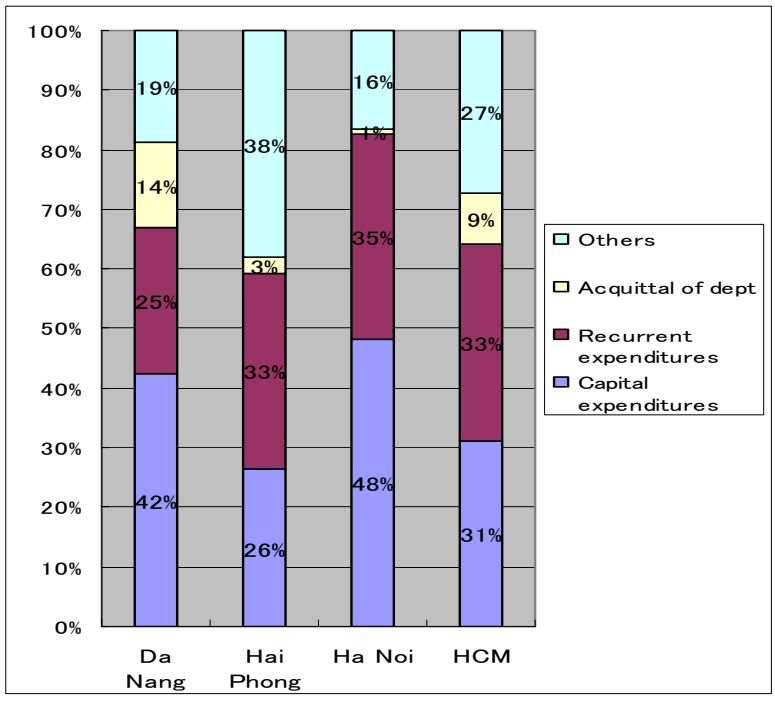


Source:

3) Expenditures by Category

13.27 Figure 13.3.5 illustrates the shares of each expenditure item in Danang, Hai Phong, Hanoi, and Ho Chi Minh in 2006.

Figure 13.3.5 Expenditures of Major Vietnamese Cities by Category, 2006



Source:

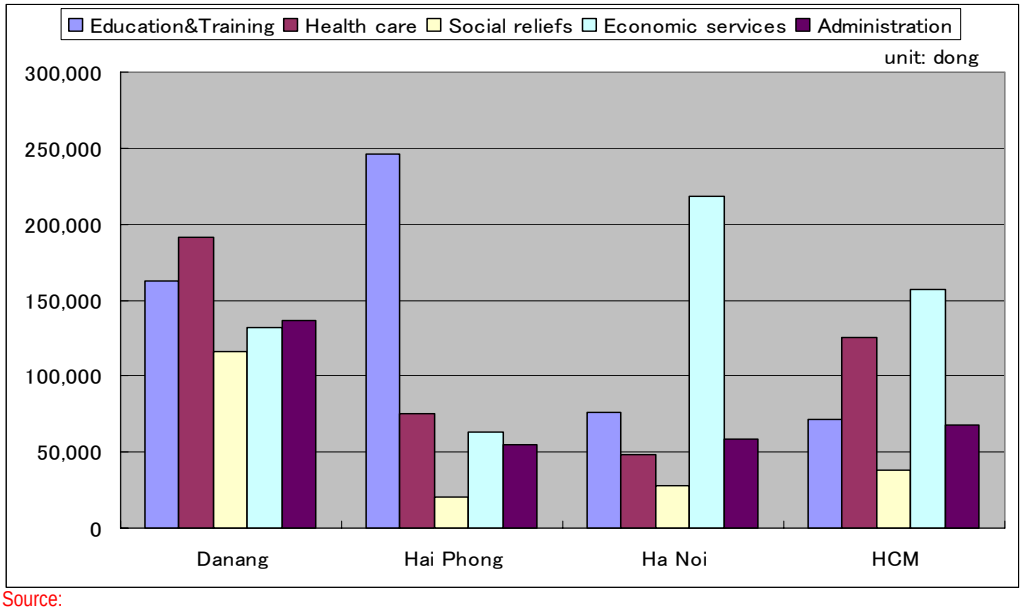
13.28 The figures for capital investments in Danang and Hanoi are high. Both cities spent around half of their respective budgets on capital expenditure, while both Hai Phong and Ho Chi Minh only spent around 30%. Continuous high spending on capital expenditures will eventually burden future municipal budgets with higher O&M budget. Conversely, the percentage of recurrent expenditure in Danang was lower than the other cities (Figure 13.3.5).

13.29 In addition, in 2006 Danang had a relatively higher percentage of debt, while the other three cities maintained their debts at low levels. The share of debt in Danang increased from 2004 to 2006.

4) Expenditures by Purpose

13.30 Figure 13.3.6 illustrates the recurrent expenditure per capita by sector in 2006. Danang's allocations for health care, social services, and administration exceed those in the other three cities, owing to its high municipal budget per capita (see Figure 13.3.2).

Figure 13.3.6 Expenditures of Major Vietnamese Cities by Purpose, 2006



Source:

13.31 The budget for social services in 2006 was outstanding: it was more than double those of Hai Phong and Hanoi, and larger than Ho Chi Minh's. The Danang People's Committee placed priority on spending for social services such as grants for poor households/minorities, mass-based organizations, and mutual aid groups.

13.32 The figures on economic services covered all spending except administrative and training costs in recurrent expenditures such as small-scale repair of roads, promotion of scientific/cultural activities, provision of trust funds to public service/goods delivery agencies, and so on. Substantially, these expenditures equaled their respective administrative costs.

13.4 Municipal Finance Issues in Danang

13.33 In this section, three issues are explained as the fundamental points in public financial management for urban development in Danang.

(1) Securing the Necessary Municipal Revenue

13.34 The role of Danang City as leader in the region is extremely important to the development of the central coastal regions; therefore, strengthening regional development lies in placing Danang at its core and securing the requisite financial resources. Without simply relying on the temporary investments of the central government, the municipal government should generate independent and stable revenue of its own. Substantial research is therefore required to ascertain feasible revenue sources. In the Chapter 12.1, DaCRISS examines and proposes some new revenue sources for the Danang municipal finance.

13.35 Vietnam has its own tax and revenue source system. All taxes are state taxes—basically, there is no local tax (although the State has permitted local authorities to charge their residents some independent fees, but the accrued revenue from these is minimal). With mutual consent, most state taxes are shared between the State and local government, except for taxes that involve large amounts, such as those on imports/exports and oil, which are collected solely by the State. In fact, it is the difference between the assigned and the actual tax collected that is made available for the municipal/provincial budget. The amount of such discretionary budget seems to range from five to 20% of the total municipal revenue, if it is calculated based on the provisions in the National Budget Law.

13.36 Taxes on imports/exports account for a large portion of a state's total tax revenue in Hai Phong and Ho Chi Minh, especially in Hai Phong, where it can reach 70%. World Trade Organization (WTO) rules will affect import/export taxes which, in turn, will result in a significant drop in revenue. In the future, the expanding share of income taxes generated from domestic economic activities should become an important financial source for municipal governments. In addition, the reform of the individual tax systems that will be introduced in 2009 is worthy of attention. Compared with other countries, Vietnam is in the nascent stages of building a taxation system. Expeditious taxation reforms are currently being undertaken by the government, especially in the adjustment and optimization of income taxes such as corporate and individual. According to tax authorities, Vietnamese citizens are not well versed in their tax obligations, and most municipal residents, who in the past have been absolved from individual taxes, will prospectively be required to pay a modest amount of tax.

13.37 Taxes on capital assets were imposed in Vietnam before; however, these were legislated in an uncoordinated fashion: there were taxes on transferring land-use right, using agricultural land, and registering land use, as well as land-use fees, among others. Currently, the government is formulating the law on property tax, since most people now have a higher standard of living and people living in metropolises, such as Hanoi and HCM City, are apt to possess considerable cash and assets.

13.38 Another financial source is the public financing system that allows municipal organizations to acquire loans. This funding is provided by public financial institutions (e.g., deposits and savings in state banks). However, the feasibility of long-term loans or state preferential loans should be examined carefully. The National Budget Law imposes severe

restrictions on municipal governments incurring debts and very carefully regulates the conditions and scope for borrowing funds from banks. In conjunction with this regulation, the major cities in Vietnam are maintaining debts at low levels. However, in terms of the potential for economic growth such loans offer and assuming an eventual shortage of financial sources, the institutionalization of public financing should be promoted.

(2) Balancing Capital Investments and Recurrent Expenditures

13.39 Urban development requires a rigid balance between budgeting and spending, especially between capital investments and recurrent expenditures. It is less likely that these two expenditures will follow the rule; but what is important is for policy makers to allocate the budget flexibly so that it matches the local conditions in an efficient manner.

13.40 A befitting budget appropriation needs to: (i) ensure the autonomy of the local government in the budget allocation, and (ii) establish the managing cycle of controls on spending based on the situation of ongoing development projects. The Government of Vietnam executes development policies in accordance with the five-year SEDP. In conformity with the plan, municipal policy makers allocate resources based on the local situation of the development.

13.41 Regarding the autonomy of local governments, a series of reforms, such as the amendment of the National Budget Law and the Public Administration Reform (PAR, described in later paragraphs), have contributed to decentralization of public financial management. Consequently, municipal/provincial budgets are now planned, decided, and adjusted by the local authorities. But while municipal/provincial governments may have a fairly significant level of autonomy in their budget preparation, the central government still has strong leverage over local level budgeting through its policies and state papers. Furthermore, state budget revenue, or state taxes, are to be shared between the central and local governments depending on the budgetary situation of the local government. In the case of Danang, the city's share is 90%.

13.42 Before the Doi Moi reforms were implemented, there was only the national budget to speak of: local governments functioned as units which implemented and executed the national policy and budget. The National Budget Law enacted in the 1990s clarified the definition of revenues and expenditures between the central and local governments.

13.43 Another point of concern in the managing cycle for budgeting is that two line agencies, namely, the Ministry of Planning and Investment and the Ministry of Finance, give separate estimates of two expenditures. These two agencies calculate expenditures based on their own respective formula. Vietnam has maintained a consistent economic growth, prioritizing expenditures. With this trend, central and local governments have attempted to maximize capital expenditures and minimize recurrent expenditures. Furthermore, current legislation regulates the increasing rate of recurrent expenditure to the extent that it does not exceed capital expenditure. In analyzing public financial management for urban development, the actual interaction between the two agencies should be substantially reviewed.

13.44 While the National Budget Law has made favorable contribution to defining public finance for the relevant authorities at the central, municipal/provincial, and district levels, on another front, it does not include a provision to ensure the quality and equity of public goods/services. For instance, it is very important to define the scope of responsibility for matters such as road construction among the state, municipal, and district governments—

user convenience cannot be improved without ensuring the quality of the national, city, and district roads. Since roads are attributed to shared public goods, the total quality of road networks is relevant to users.

13.45 The audit activities of the municipal budget are implemented by the national audit authority. While auditing shows whether or not the relevant administrative unit practices accounting laws, it does not monitor and evaluate the effectiveness of the unit's financial management capacity. Additional monitoring is required so that budget preparations reflect the outcomes and performances of implemented administrative activities.

(3) Managing Operation and Maintenance (O&M) Works

13.46 The next issue is a concrete mechanism in the future operation and maintenance of public assets. Infrastructures will be upgraded in accordance with economic growth. All resources, which include the central, municipal/provincial, and private investments, are mobilized for infrastructure construction. Meanwhile, infrastructures created by these investment, will have to be well operated and maintained by limited finance and capacity of municipalities/provinces; otherwise, capital assets will soon deteriorate. Hence, in terms of public financial management, establishing sustainable O&M mechanisms is a critical issue.

13.47 Since 2001, the Vietnamese government has been implementing the Master Programme on Public Administration Reform (PAR) and will continue to do so until 2010. This program insists on streamlining administrative costs, contracting out service delivery associated with administrative work, privatizing state-owned enterprises, and implementing other such measures. The importance of streamlining public services lies in its potential effect of improving the quality and equity of service provision, as well as maximizing convenience for users.

13.48 PAR includes public finance reform as one of its four reform contents. Public finance reform comprises action programs such as financial decentralization (as mentioned above), staff downsizing, and the revival of the mechanisms for financial management.

13.49 Staff downsizing is implemented through the block grant and staffing mechanisms. As such, the total amount of staff, work, and budget are assigned to a unit/section in an administrative agency, requiring the staff to manage all the assigned work within the given budget. This system reportedly contributes to improving the efficiency of administrative work and to reducing expenses since the amount saved can be appropriated to the staff salary reform program.

13.50 The revival of the mechanisms for financial management is based on the concept of separating public administration agencies from public service delivery entities. Concretely, this is implemented by contracting public service units, renting out land to the social development sector, or contracting out public services such as urban sanitation, drainage, and park tree management, among others. These new units include income-generating service delivery agencies, joint-stock companies, and some subcontracted units within administrative organizations.

13.51 A World Bank paper pointed out that expenditure monitoring at the level of budget items for municipal finance offices is less satisfactory, leading to limitations in budget preparations. Moreover, it reported that there is a considerable difference between budgeted and actual expenditures. This appears to reflect the considerable flexibility enjoyed by provinces in implementing the budget once it is passed.

13.52 As mentioned above in the context of budget planning, the responsible agent for the construction of capital assets (MPI/DPI) differs from the one financing the costs of operations and the maintenance of public services (MOF/DOF). A concern, therefore, is whether or not good services for all residents are secured. For example, in the transportation sector, new constructions and large-scale repair works are planned by the MPI/DPI, whereas small-scale reparations are under the DOF. It seems difficult to prioritize projects between the two agencies without accurately monitoring actual field information.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