5. Results of Natural Condition and Environment Survey

5 − 1 . Meteological Data

Table-1. Average temperature by month (1982-1993)

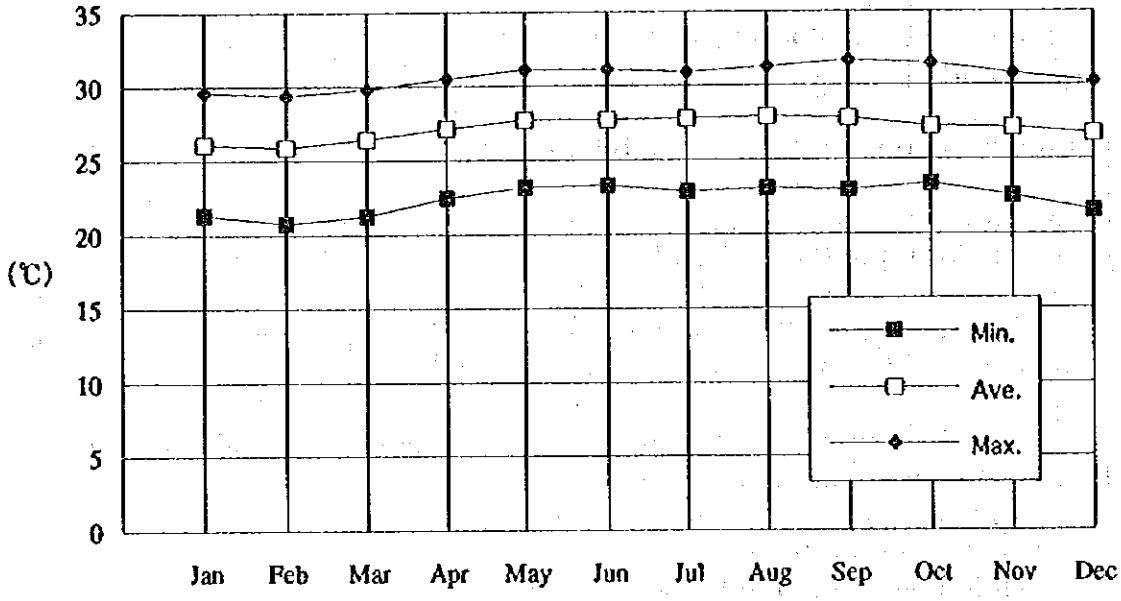
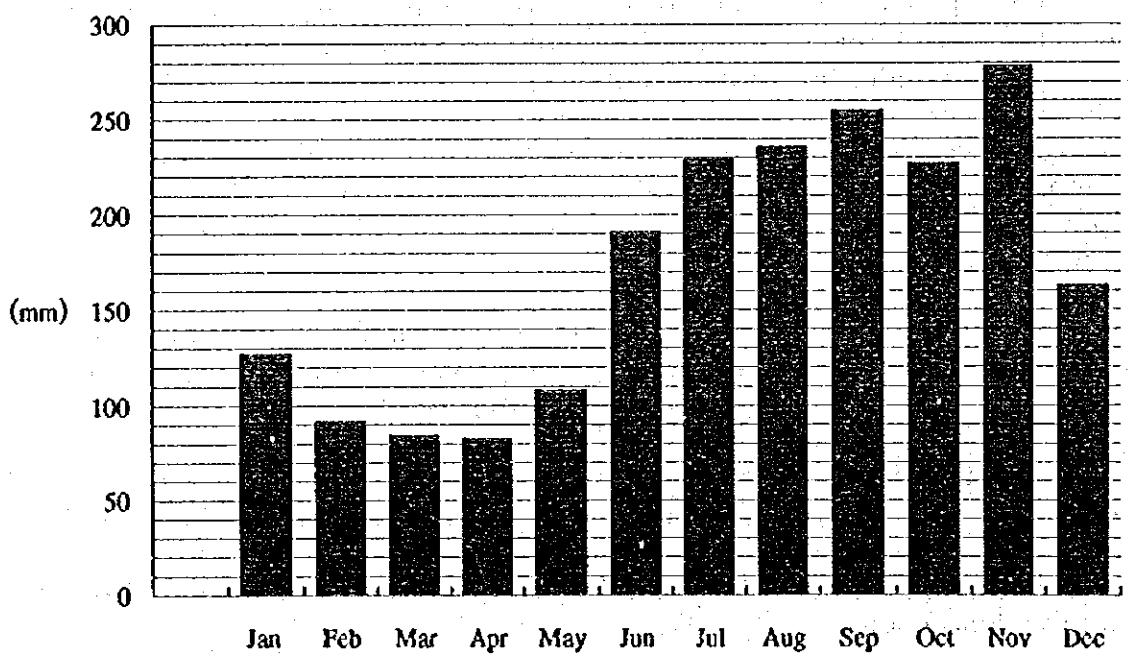


Table-2. Average percipitation by month (1979-1994)



Table－3. Estimated percipitation at Canouan

Month	Estimeted rate of rainfull in comparison with Kingstown	Percipitation at KIngstown	Estimated percipitation at Canouan
1	0.4	127.2	50.9
2	0.2	92.0	18.4
3	0.2	84.2	16.8
4	0.2	82.8	16.6
5	0.2	108.0	21.6
6	0.4	191.1	76.4
7	0.6	229.1	137.5
8	0.6	235.8	141.5
9	0.6	254.8	152.9
10	0.6	226.8	136.1
11	0.6	278.4	167.0
12	0.4	163.1	65.2
total		2,073.3	1,000.9

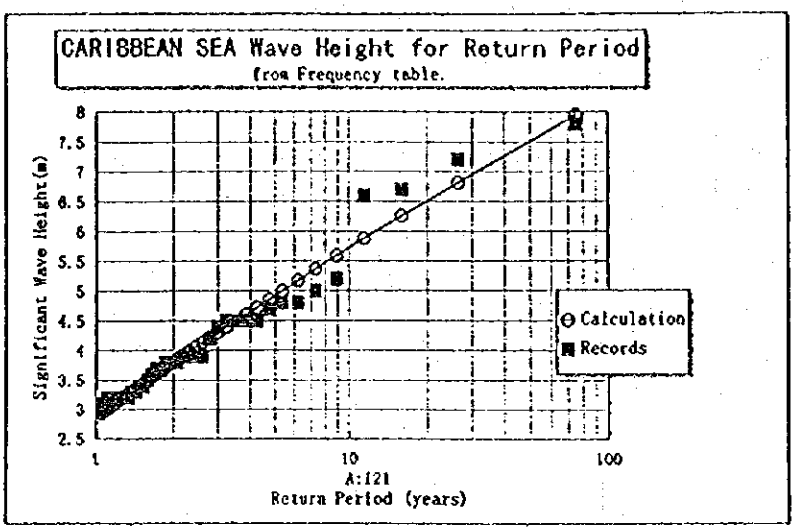
Table－4. Average wind speed by month

Month	1	2	3	4	5	6	7	8	9	10	11	12
Average wind speed (m/s)	6.2	6.2	6.0	5.8	6.0	6.4	5.7	4.9	4.7	4.7	4.9	5.6

5 — 2 . Relevant Data on Determination of Designal Wave Height

(1) Calculation of Probable Significant Wave Height (based on revolution analysis)

CALCULATION OF PROBABLE Wave
Weibull β= 0.5 α 0.46
k= 1.1 1/k= 0.91



Vmax (m/s)	frequency	total	Calculation n nos.	P(x)	rv	Vxcal (m)	Ret. per. (years)
7.8	1	1	1	0.988	3.837	7.96	74.94
7.2	1	1	2	0.965	2.994	6.81	26.28
6.7	1	1	3	0.942	2.583	6.25	15.93
6.6	1	1	4	0.919	2.307	5.88	11.43
5.2	1	1	5	0.896	2.098	5.59	8.91
5	1	1	6	0.873	1.930	5.36	7.30
4.8	1	1	7	0.850	1.788	5.17	6.19
4.8	1	1	8	0.827	1.665	5.01	5.37
4.7	1	1	9	0.804	1.557	4.86	4.74
4.5	1	1	10	0.781	1.461	4.73	4.24
4.5	1	1	11	0.758	1.373	4.61	3.84
4.5	1	1	12	0.735	1.293	4.50	3.51
4.5	1	1	13	0.712	1.219	4.40	3.23
4.4	1	1	14	0.689	1.151	4.31	2.99
4.2	1	1	15	0.666	1.087	4.22	2.78
3.9	1	1	16	0.643	1.027	4.14	2.60
3.9	1	1	17	0.620	0.970	4.06	2.45
3.9	1	1	18	0.597	0.916	3.99	2.31
3.9	1	1	19	0.574	0.865	3.92	2.18
3.8	1	1	20	0.551	0.817	3.85	2.07
3.8	1	1	21	0.528	0.770	3.79	1.97
3.8	1	1	22	0.505	0.726	3.73	1.88
3.7	1	1	23	0.482	0.683	3.67	1.80
3.7	1	1	24	0.459	0.642	3.61	1.72
3.6	1	1	25	0.436	0.602	3.56	1.65
3.5	1	1	26	0.413	0.564	3.51	1.58
3.4	1	1	27	0.390	0.527	3.46	1.52
3.4	1	1	28	0.367	0.491	3.41	1.47
3.3	1	1	29	0.344	0.456	3.36	1.42
3.3	1	1	30	0.321	0.422	3.31	1.37
3.2	1	1	31	0.298	0.389	3.27	1.32
3.2	1	1	32	0.275	0.356	3.23	1.28
3.2	1	1	33	0.252	0.325	3.18	1.24
3.2	1	1	34	0.229	0.294	3.14	1.21
3.2	1	1	35	0.206	0.264	3.10	1.17
3.2	1	1	36	0.183	0.234	3.06	1.14
3.2	1	1	37	0.160	0.204	3.02	1.11
3.1	1	1	38	0.137	0.175	2.98	1.08
3	1	1	39	0.114	0.147	2.94	1.05
3	1	1	40	0.091	0.118	2.90	1.02
2.9	1	1	41	0.068	0.090	2.86	1.00
2.9	1	1	42	0.046	0.061	2.82	0.97
2.7	1	1	43	0.022	0.032	2.78	0.95
total	43	43		21.708	41.510	174.30	224.21

Return period in 20 yea	0.953	2.771	6.51	20.00
Return period in 30 yea	0.969	3.102	6.96	30.00
Return period in 40 yea	0.977	3.334	7.28	40.00
Return period in 50 yea	0.981	3.514	7.52	50.00

(*) $Vx = 1.36 \times rv + 2.7406$

(2) Calculation of Significant Wave Height at Calliaqua, St.Vincent

Offshore wave						Composed Wave direction	Distribution Di	Refraction Kr	Diffraction Kd	Converted offshore wave Ho'(m)	Wave direction to shallow water	Ho'/Lo	Depth (h)	h/Ho'	H/Ho'	Wave height H(m) at peak	Wave height H(m) at revetment at jetty
Direction	Height Ho(m)	Cycle T(sec)	Length Lo(m)	Ho/Lo	Smax												
SE	7.0	12.0	224.6	0.03	10	+47.0	0.0100	0.435	1.000	2.07	S23.6° E	0.0092	3.82	1.85	1.60		3.31
						+33.5	0.0450	0.336	1.000				1.14	0.55	0.64		1.32
						+10.0	0.3200	0.336	1.000				1.64	0.79	0.74		1.53
						-11.5	0.3900	0.336	1.000								
S	7.0	12.0	224.6	0.03	10	+60.0	0.0750	0.729	1.000	2.06	S23.6° W	0.00916	3.81	1.85	1.6		3.29
						+ 2.0	0.1050	0.435	1.000				1.14	0.55	0.64		1.32
						-10.5	0.1150	0.341	1.000				1.64	0.80	0.75		1.54
						-27.5	0.0950	0.341	1.000								
						-52.5	0.0200	0.341	1.000								
SW	7.0	12.0	224.6	0.03	10	+20.5	0.2445	0.433	1.000	2.35	S34.4° W	0.01048	4.05	1.72	1.94		4.57
						- 1.0	0.2445	0.495	1.000				1.14	0.48	0.48		1.13
						-43.0	0.0510	0.380	1.000				1.64	0.70	0.67		1.58

(3) Calculation of Significant Wave Height at Friendship Bay, Canouan Is.

Offshore wave						Composed Wave direction	Distribution Di	Refraction Kr	Diffraction Kd	Converted offshore wave Ho'(m)	Wave direction to shallow water	Ho'/Lo	Depth (h)	h/Ho'	H/Ho'	Wave height H(m) at peak	Wave height H(m) at revetment at jetty
Direction	Height Ho(m)	Cycle T(sec)	Length Lo(m)	Ho/Lo	Smax												
SE	7.0	12.0	225.0	0.0312	10	+25.0	0.2015	0.700	0.280	0.85	S27.2° E	0.0037846	1.70	2.00	1.89		1.61
						+ 6.5	0.2020	0.825	0.200				1.70	2.00	1.89		1.61
						-11.0	0.2015	0.962	0.090				3.00	3.53	1.42		1.21
S	7.0	12.0	225.0	0.0312	10	+63.0	0.0330	0.483	1.000	1.00	S17.7° E	0.0044565	2.00	2.00	1.89		1.89
						-14.5	0.1965	0.615	0.310				2.00	2.00	1.89		1.89
						-38.0	0.1965	0.845	0.200				3.00	3.00	1.55		1.55
SW	7.0	12.0	225.0	0.0312	10	+23.5	0.0845	0.481	1.000	1.34	S46.8° W	0.0059467	2.58	1.93	1.80		2.40
						+15.0	0.0845	0.436	1.000				2.14	1.60	1.53		2.40
						-66.0	0.0720	0.407	0.260				3.00	2.25	1.70		2.27

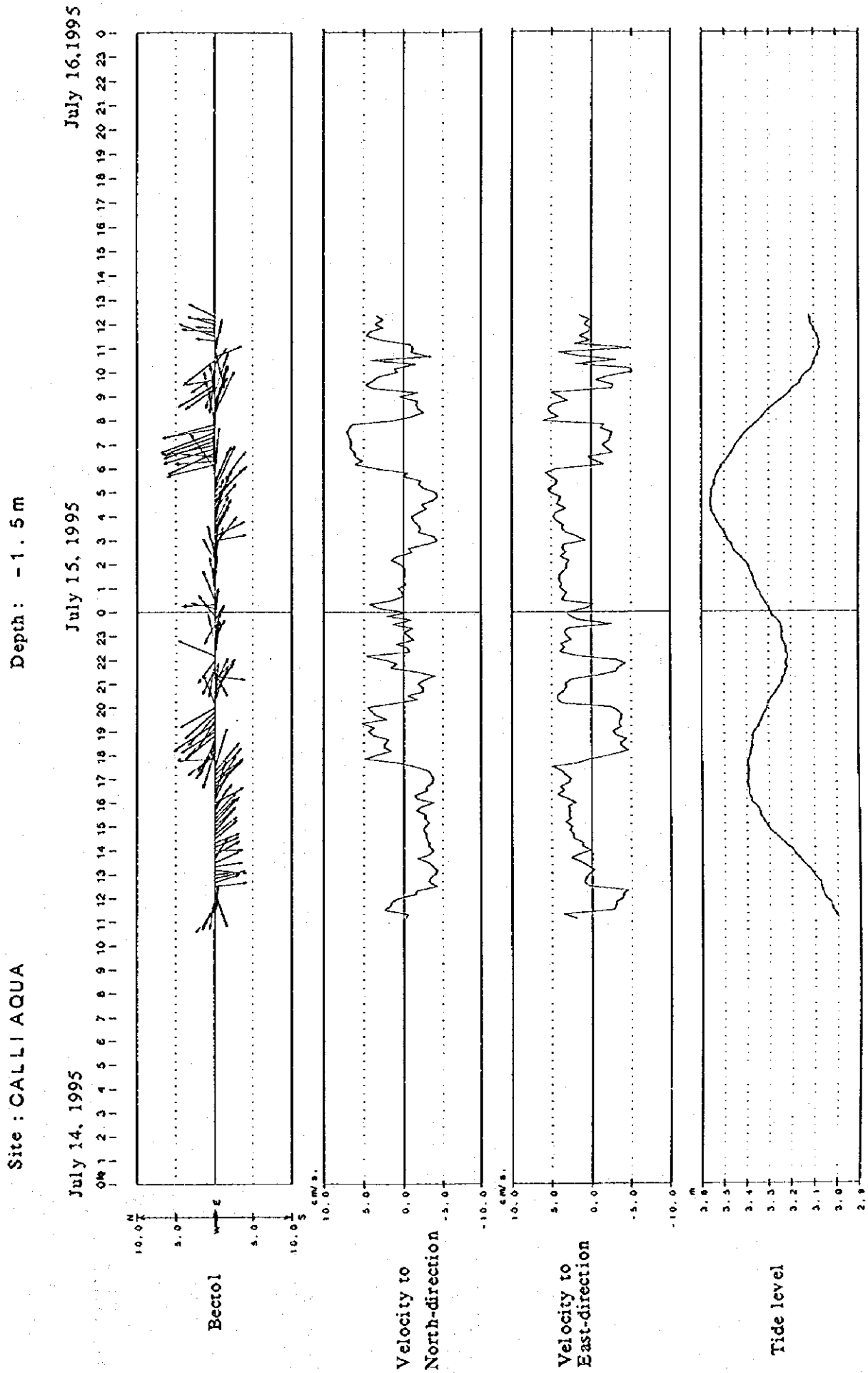


Fig-1. Changes of Observed Data by Time

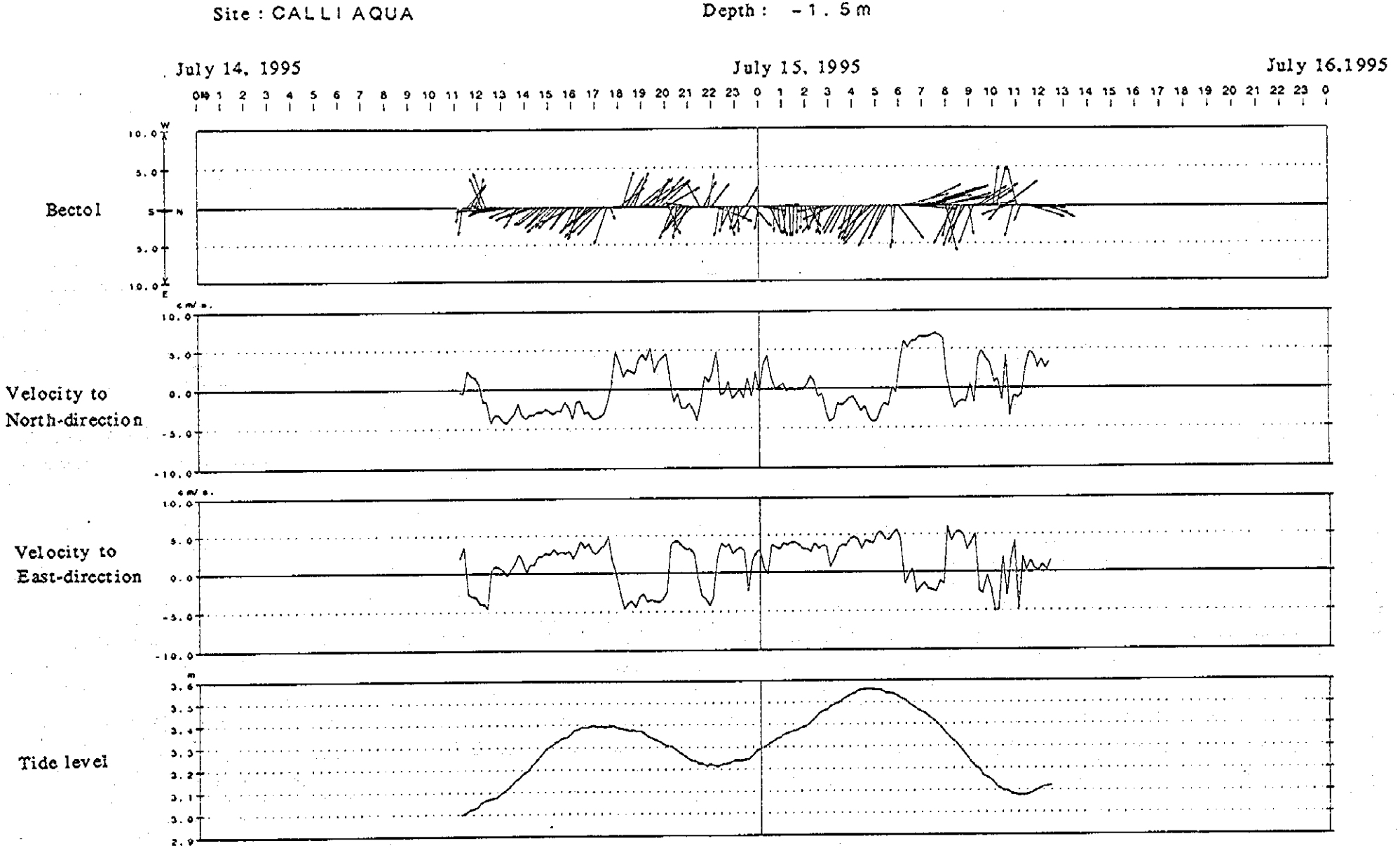


Fig-2. Changes of Observed Data by Time

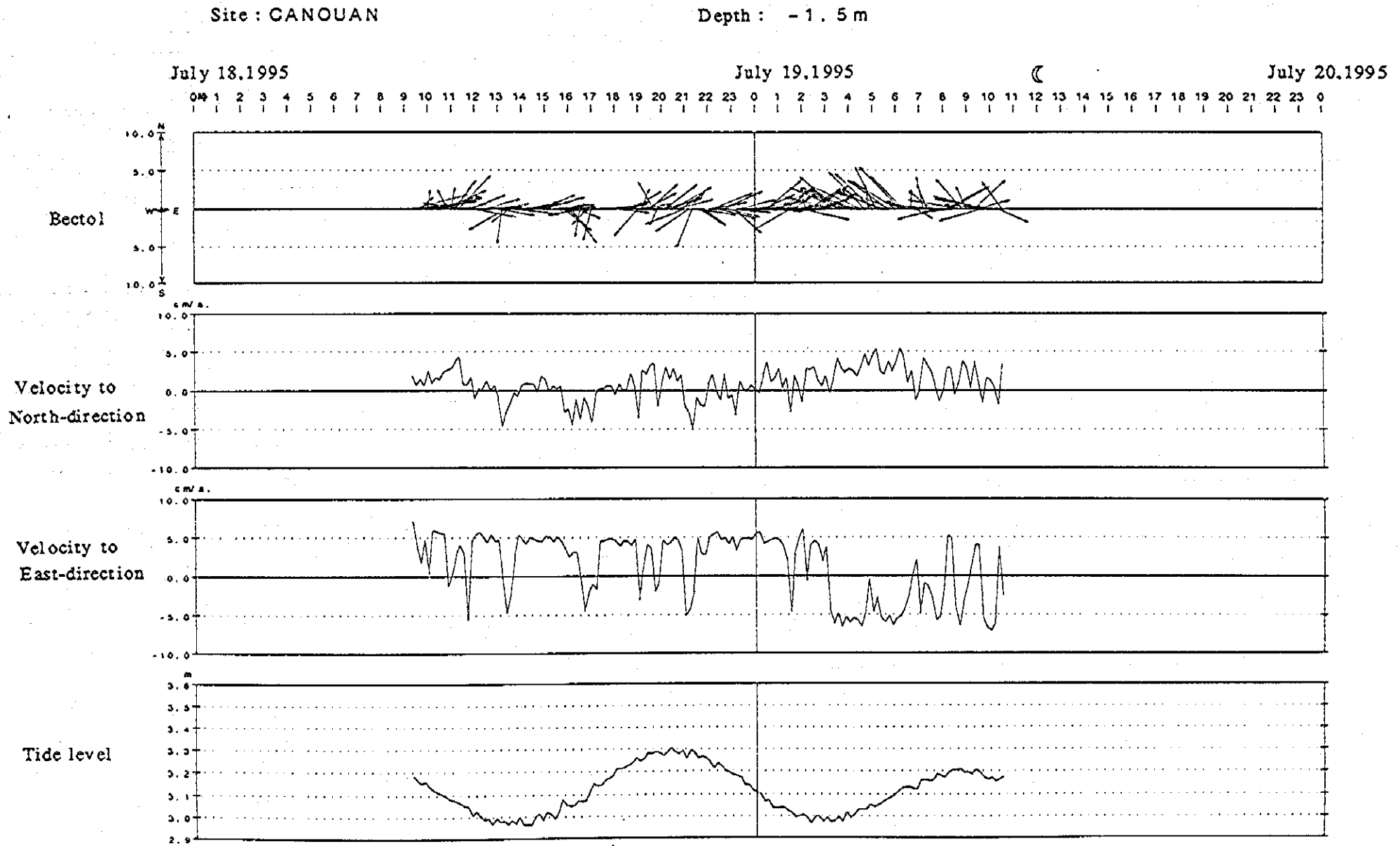


Fig-3. Changes of Observed Data by Time

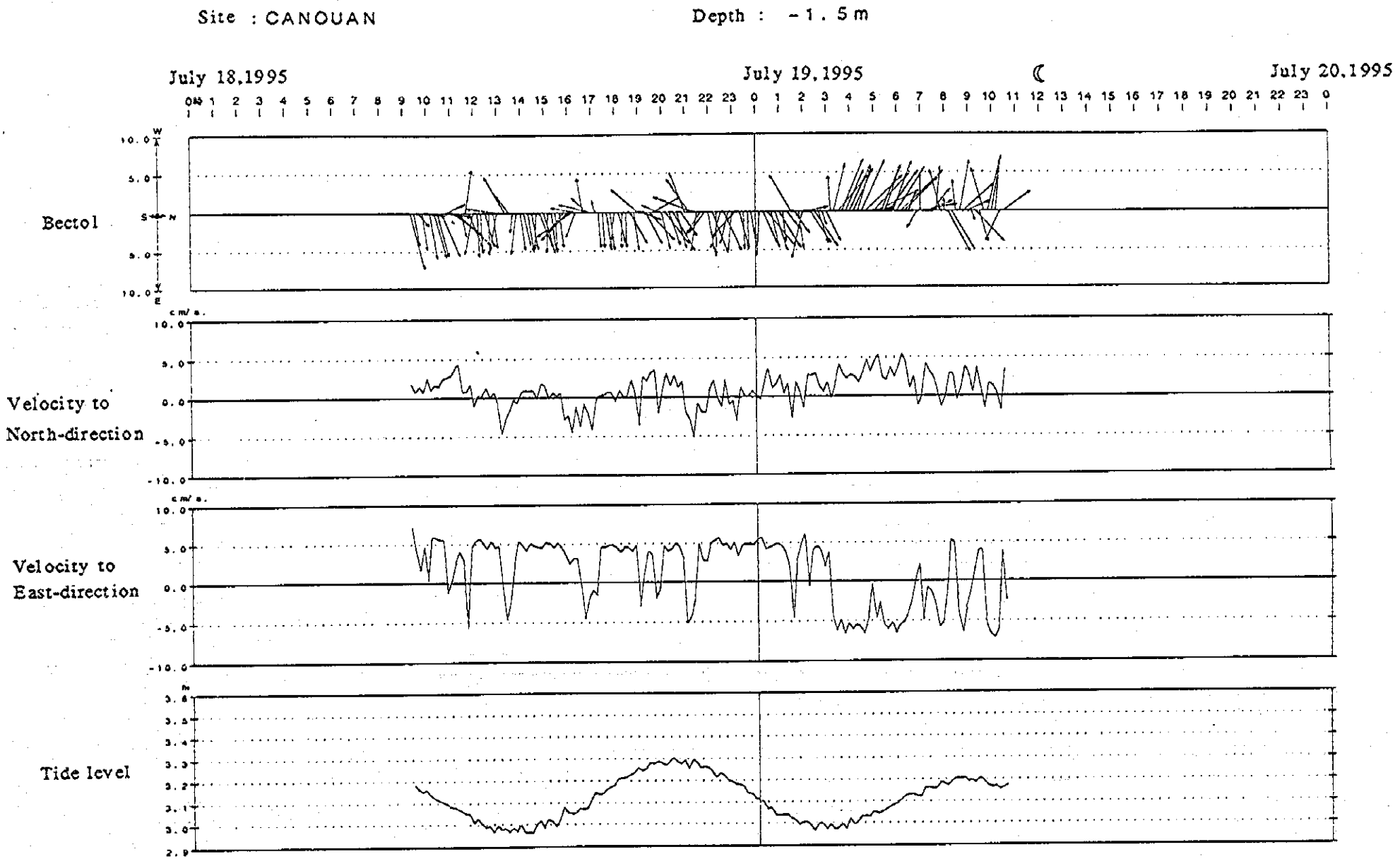
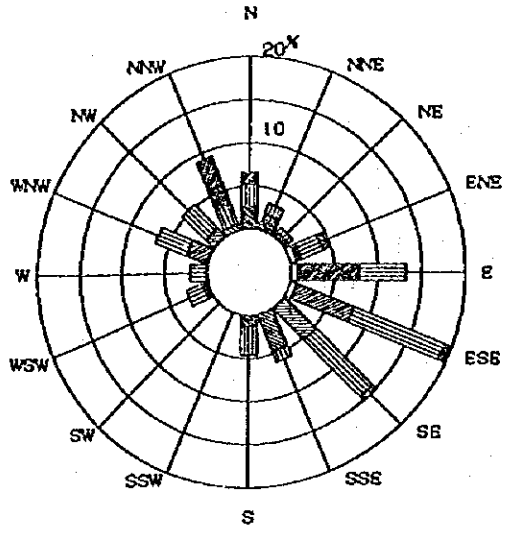


Fig-4. Changes of Observed Data by Time

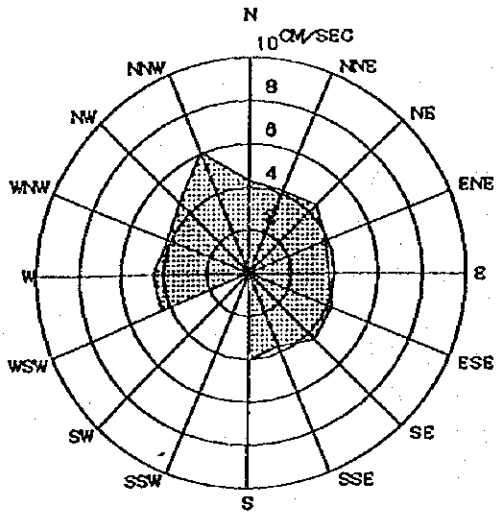
ST. 1 -1. 5M

July 14-15, 1995

Direction of tidal flow



Average velocity of tidal flow



Frequency by velocity of tidal flow

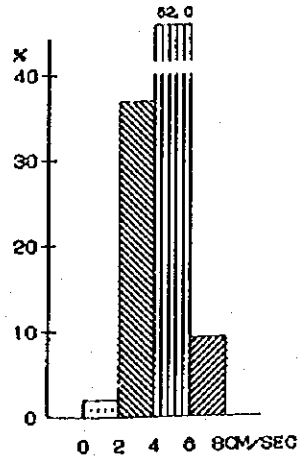


Fig-5. Frequency of Tidal Flow

CALL I AQUA

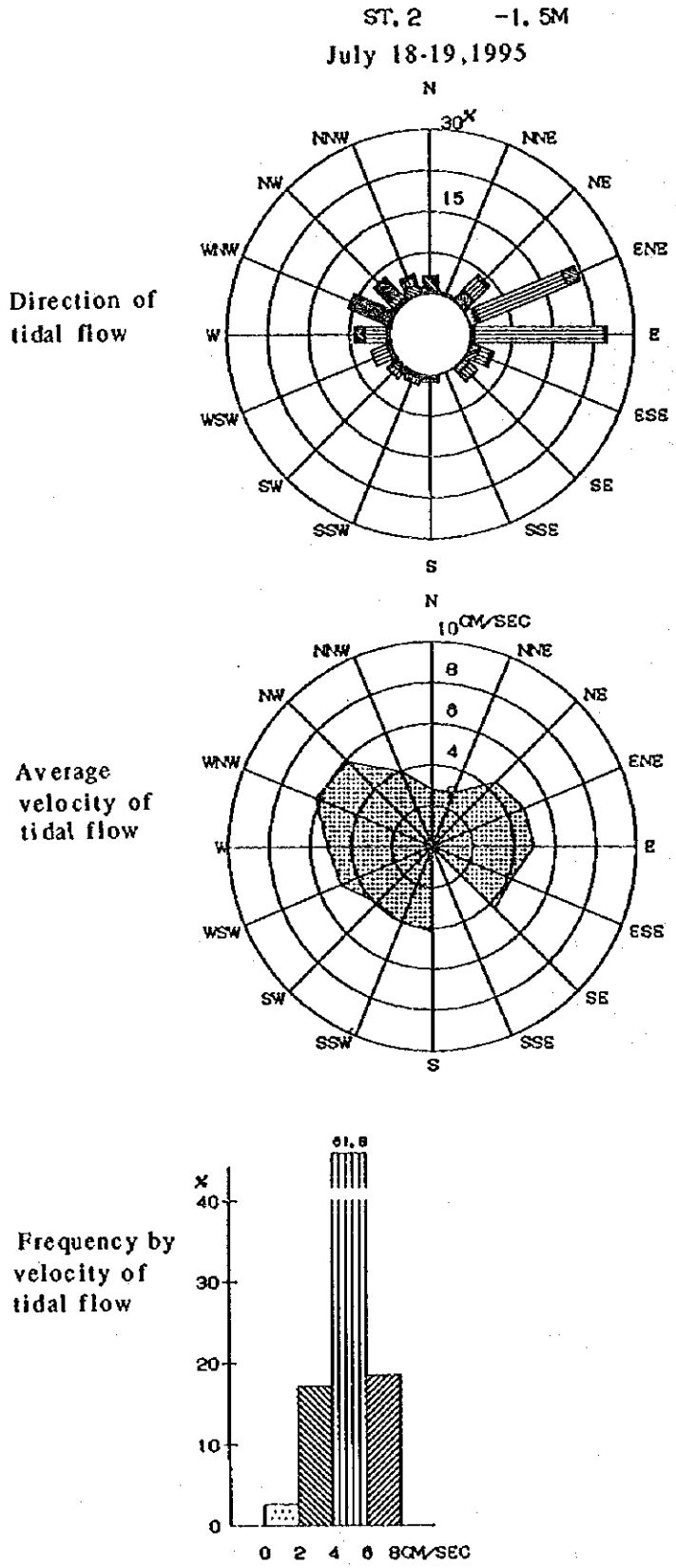


Fig-6. Frequency of Tidal Flow

CANOUAN

5 – 4 . Results of soil investigation and land survey

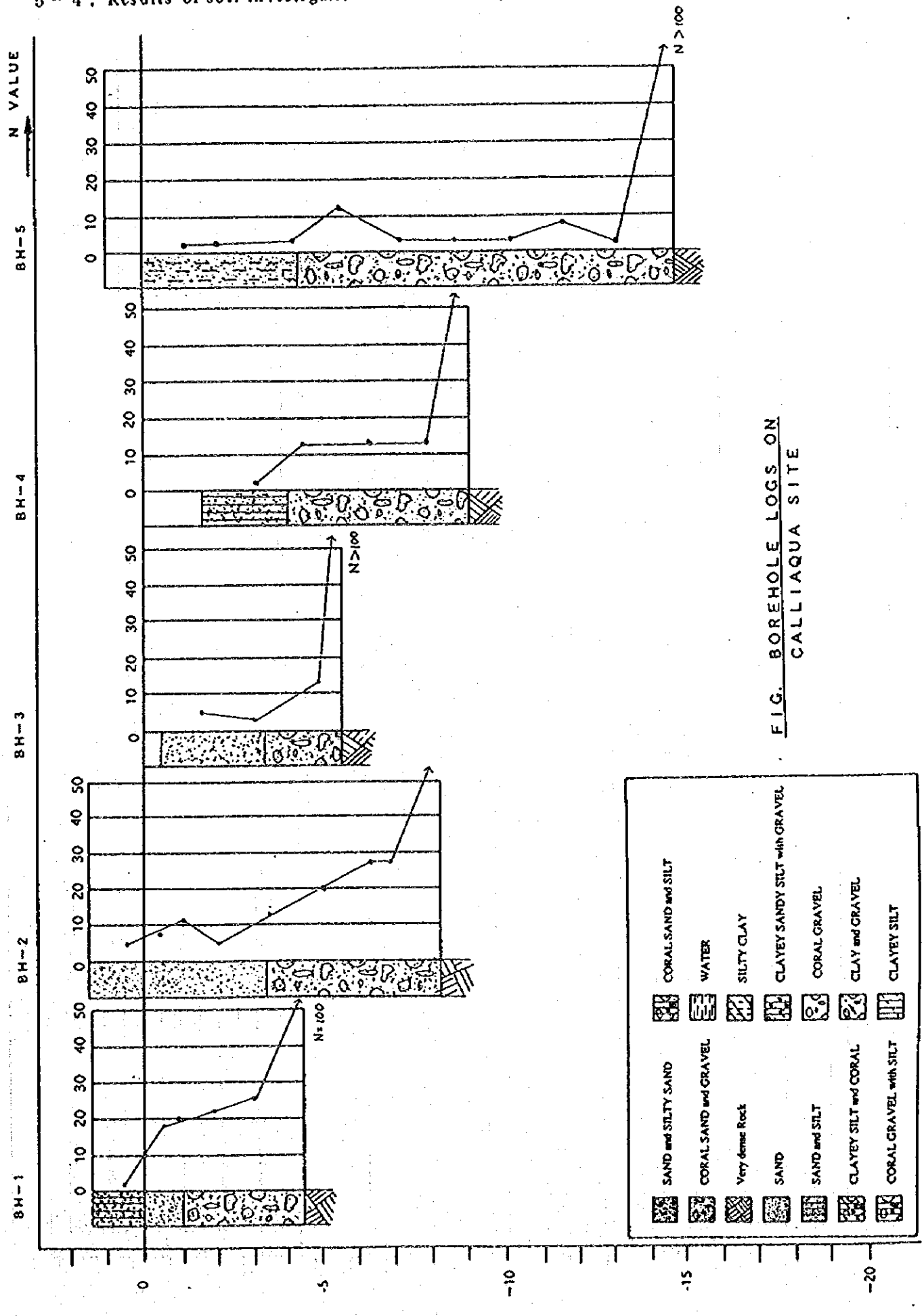


FIG. BOREHOLE LOGS ON CALLIAQUA SITE

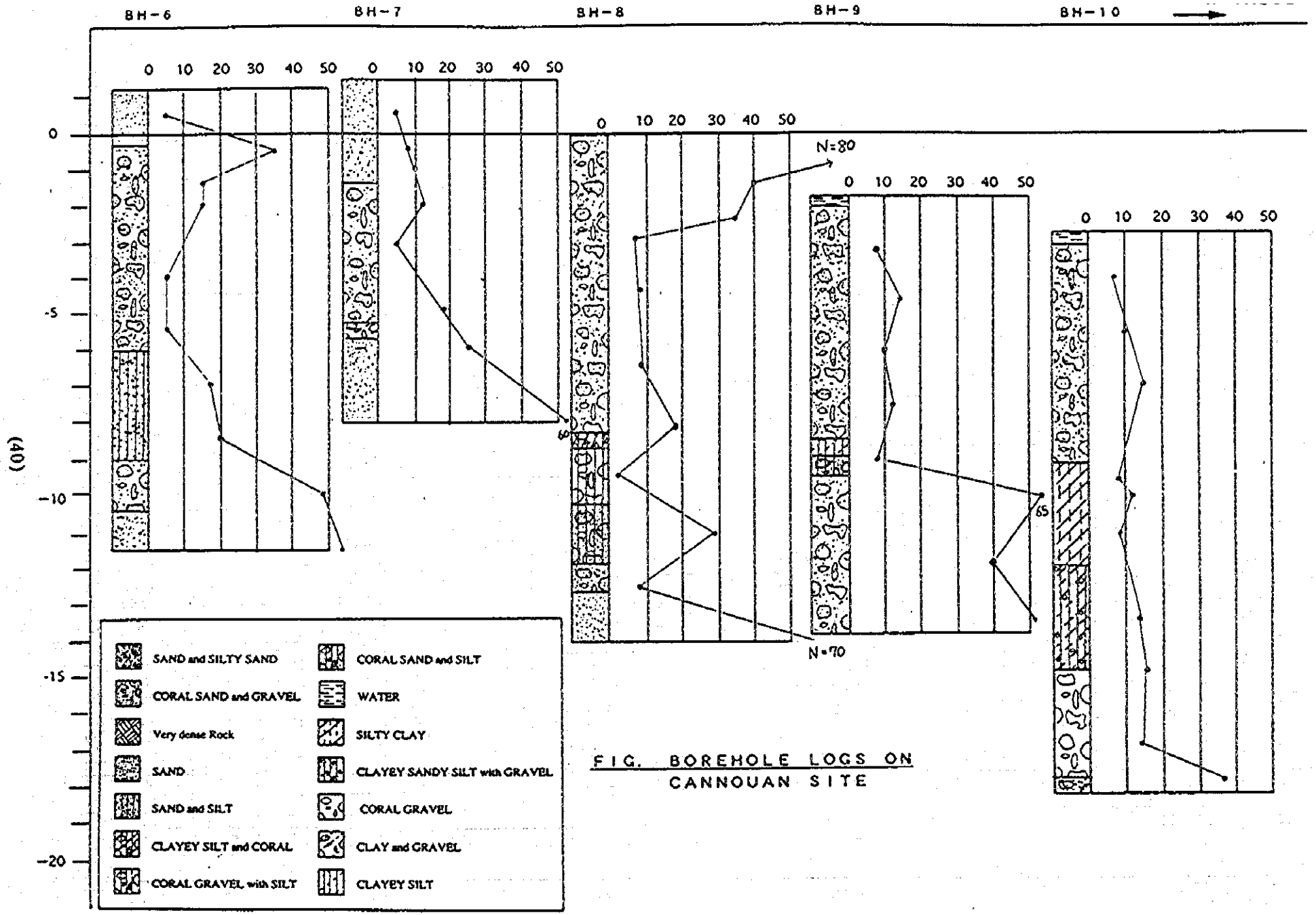
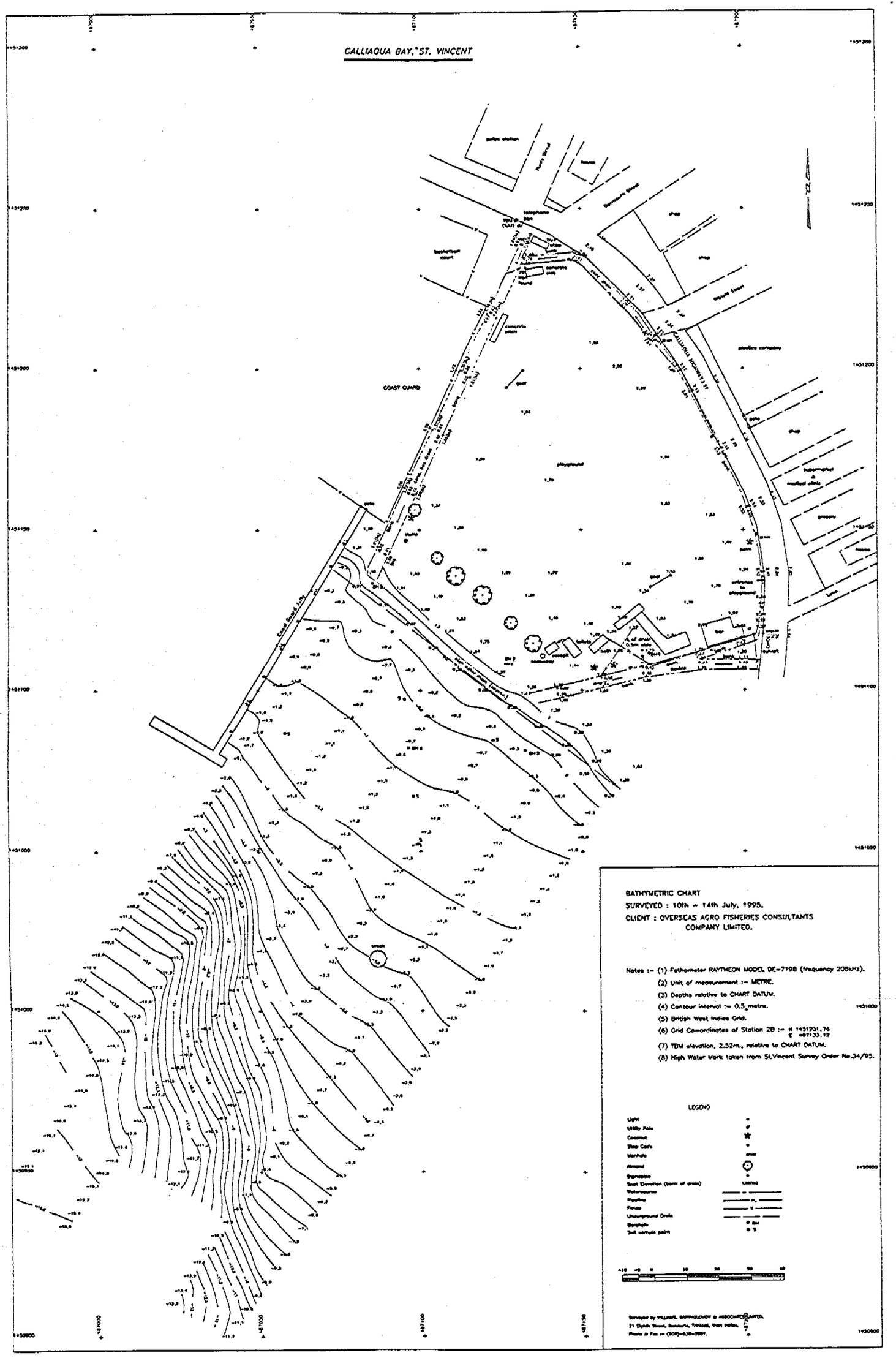


FIG. BOREHOLE LOGS ON CANNOUAN SITE

CALLIAQUA BAY, ST. VINCENT



BATHYMETRIC CHART
SURVEYED : 10th – 14th July, 1995.
CLIENT : OVERSEAS AGRO FISHERIES CONSULTANTS COMPANY LIMITED.

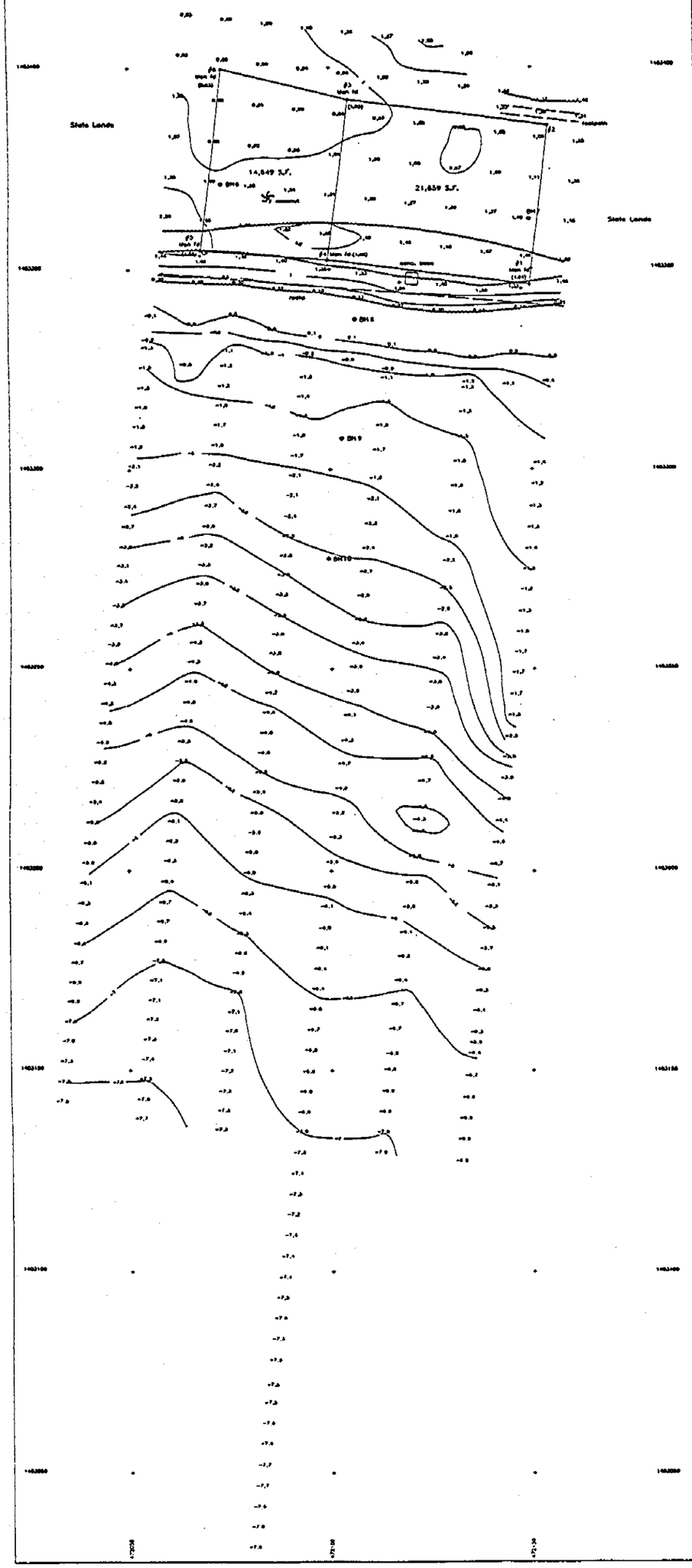
Notes :– (1) Fathometer RAYTHEON MODEL DE-719B (frequency 208kHz).
(2) Unit of measurement :– METRE.
(3) Depths relative to CHART DATUM.
(4) Contour interval :– 0.5 metre.
(5) British West Indies Grid.
(6) Grid Co-ordinates of Station 2B :– N 1451231.78
E 487133.12
(7) TBM elevation, 2.52m., relative to CHART DATUM.
(8) High Water Mark taken from St.Vincent Survey Order No.34/95.

LEGEND

Light
Utility Pole
Coconut
Stop Cock
Manhole
Armoire
Standpipe
Spot Elevation (bank or drain)
Watercourse
Pipeline
Fence
Underground Drain
Borehole
Soil sample point

Surveyed by WILLIAMS, BAPTISTE & ASSOCIATES LIMITED.
21 Elphin Street, Bandorite, Trinidad, West Indies.
Phone & Fax :– (809)-636-7897.

FRIENDSHIP BAY, CANOUAN



BATHYMETRIC CHART

SURVEYED : 12th & 13th July, 1995.

CLIENT : OVERSEAS AGRO FISHERIES CONSULTANTS COMPANY LIMITED.

Notes :– (1) Fathometer RAYTHEON MODEL DE – 719B (frequency 208kHz).
(2) Unit of measurement :– METRE.
(3) Datum is 1.64m below Mon #1.
(4) Contour interval :– 0.5 metre.
(5) British West Indies Grid.
(6) Grid Co-ordinates of Mon #1 – N, 1 403 346.0 m
E, 472 149.0 m

TRAVERSE		
Sta. - Sta.	Bearing	Distance
#1 - #2	088°41'	40.35
#2 - #3	273°15'	30.10
#3 - #4	183°10'	40.30
#3 - #6	253°35'	32.29
#6 - #5	168°34'	45.31
#5 - #4	94°37'	31.60
#4 - #1	93°09'	30.48

LEGEND

Borehole . ⊕ BH
No mark .
High water mark (approx.)
Vegetation

Surveyed by WILLARD, BATHGATE AND ASSOCIATES LIMITED.
21 Clyde Street, Belmont, Trinidad, West Indies.
Phone & Fax :– (809)—628–2681.

5 − 5 . Results of Enviroumental Survey

Table-1. Water quality

(1) Calliaqua

STA.No	Date & Time	Depth m	Temp. ℃	DO mg/l	pH	Salinity ppt	BOD mg/l	No.of colonies E. coli	Tramsparency (m)	chlorophyl-a ug/l	Remarks
1 East-side drain	7/11. 09:40	0	31.5	0.1	7.36	-	13	100 ¯ 20	-	-	
	7/13. 15:20	0	35.9	0.2	7.73	12	-	100 ¯ 20	-	-	
2 West-side drain	7/11. 09:45	0	28.3	0.2	7.28	-	70	>200	-	-	
	7/13. 15:25	0	23.6	7.9	8.25	26	-	100 ¯ 20	-	-	Seawater infrows
3 off 30m from shore	7/11. 09:50	0	29.3	7.1	8.15	36	-	20	-	0.1	
	7/14. 11:30	0	28.6	7.2	8.11	36	-	-	-	-	
4 off 60m from shore	7/14. 11:20	0	28.2	6.2	8.11	36	-	-	-	0.1	
	7/14. 11:25	-3	27.5	6.6	8.09		-	-	<10	-	

Notes :

1 . BOD : In-situ(after 5-days incubation at 20)

2 . E. coli : by the paper (after 15-hr. incubation at 37)

3 . Chlorophyl-a : based on marina observation quideline 9. 6. 5 (JAPAN)

(2)Canouan

STA.No	Date & Time	Depth m	Temp. ℃	DO mg/l	pH	Salinity ppt	BOD mg/l	No. of colonies E. coli	Tramsparency -	chlorophyl-a ug/l	Remarks
1 off 30m from shore	7/18. 09:45	0	28.3	7.3	7.88	36	-	0	-	ND	
	7/19. 10:45	0	28.4	7.8	8.14	36	-	-	-	-	
	7/18. 09:45	-2	28.3	7.2	7.91	-	-		>23	-	
	7/19. 10:45	-2	28.1	7.7	8.13	-	-		-	-	
2 off 60m from shore	7/18. 09:40	0	28.2	6.1	8.07	36	-	0	-	ND	
	7/19. 10:40	0	28.4	6.9	8.14	36	-	-	-	-	
	7/18. 09:40	-3	28.2	6.9	8.08	-	-	-	-	-	
	7/19. 10:40	-3	28.1	6.7	8.10	-	-	-		-	

Table-2. Marine Organisms

(1) Fish species observed at site

Site	Place		Species English name	Species Scientific name	Remarks
Calliaqua	Around wrecked boat	1	Spanish mackerel (young)		1995. 7. 14 10:30-11:00
		2	Banded butterfly fish		
Canouan	Rocy zone	1	Ocean surgeon	Acanthurus bahianus	1995. 7. 18 10:40-11:20
		2	Spanish hogfish	Bodianus rufus	
		3	Yellow goatfish	Mulloidiothys martinicus	
		4	Spotted goatfish	Pseudupeneus maculatus	
		5	Damselfish	Pomacentrus SP.	
		6	Squirrelfish	Holocentrus ascensionis	
		7	Sergeant major	Abudefduf Saxatilis	
		8	Bluehead wrasse	Thalassoma bifasciatum	
		9	Slippery dick	Halichoeres bivittatus	
		10	French grunt	Haemulon flavolineatum	
		11	Smallmouth grunt	Haemulon chrysargyreum	
		12	Mahogany snapper	Lutjanus mahogoni	
(4) Zoo-plankton		1	Ocean surgeon	Acanthurus bahianus	
	zone	2	Slippery dick	Halichoeres bivittatus	

(2) Algae

Calliaqua	1	Zostera SP.
Canouan	1	Zostera SP.
	2	Chaetormorha SP.
	3	Delesseriaceae

(3) Phyto-plankton

Species	Calliaqua		Canouan	
	off 30m	off 60m	off 30m	off 60m
Trichodesmium sp.	950	2880	5280	4800
Skeletonema costatum	4680	42720		
Rhizosolenia alata	120			
R. alata f. gracillima		480		
R. calcar avis		480		
R. styliformis	120			
Chaetoceros affine		1920		
C. atlanticum v. neapolitanum		2880		
C. curvisetum		3840		
C. decipiens		3360		
C. didymum v. anglica		1920		
C. distans	3960	33120		
C. lorenzianum	720	38400		
C. pendulum		960		
C. spp.	720	5760		
Biddulphia mobiliensi	600			
Cerataulina sp.	120			
Ditylum brightwellii	120	2400		
Streptotheca thamensis		480		

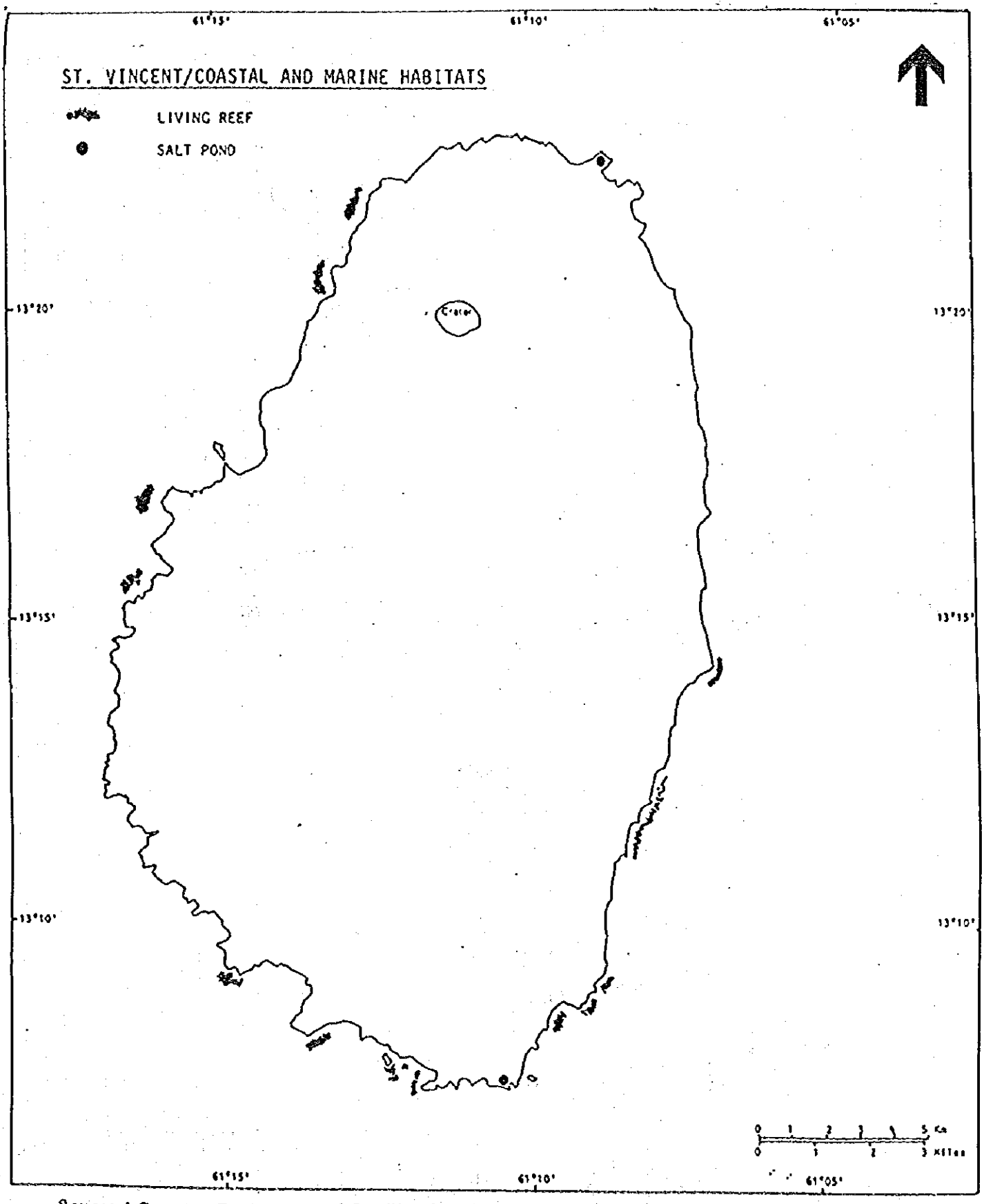
Asterionella glacialis		14880		
A. kariana	1440	6240	66000	23760
Thalassiothrix longissima		480		
Climacosphenia sp.	120			
Nitzschia pungens		1920		
Tptal No. of individuals	13680	165120	71280	28560
Total No. of species	12	19	2	2
Hauling distance (vertical haul,using ϕ 30cm NXX13 net)	1.0m	3.0m	2.0m	3.0m
Water volume filtered	71l	212l	141l	212l
No. of cells per ml (pcs./ml)	0.2	0.8	0.5	0.1

Species	Calliaqua		Canouan	
	off 30m	off 60m	off 30m	off 60m
Foraminifera			12	
Amphiloncha beloneides	20	60		
Nematoda	20		4	
Mecynocera sp. (copepodid)	20			
P. parvus		10		
P. spp (copepodid)	80	120		
Clausocalanus sp.	20	120		
Centropages furcatus (copepodid)	20			
Oithona nana	20	60		
O. spp. (davisae+copepodid)	60	120		20
Oncaea venusta		10		
O. spp.(copepodid)	20	60	4	
Corycaeus spp.(copepodid)	13	20		
Microsetella norvegica		10		
Euterpina acutifrons		30		
Harpacticoida			12	
Nauplius of Copepoda	260	390	48	60
Isopoda				20
Cresels acicula		10		
Fritillaria sp.		30		
Oikopleura spp.		90		
Polychaeta larva	60		12	
Gastropoda larva	20			7
Appendicularia larva	7	10		
Nauplius of Cirripedia	40			20
Nauplius of Panaeidae				7
Zoea of Panaeidae		10		
Total No. of individuals	680	1160	92	134
Tptal No. of species	15	17	6	6
Hauling distance (vertical haul,using ϕ 30cm NXX13 net)	1.0m	3.0m	2.0m	3.0m
Water volume filtered	71l	212l	141l	212l
No. of individuals per liter (pcs/l)	9..6	5.5	0.7	0.6
Volume of spedimented organisms (ml/l)	0.004	0.002	0001	0.001
Wet weight (mg/l)	8.1	2.5	3.6	2.0

Table-3. Existing major plants at Canouan site

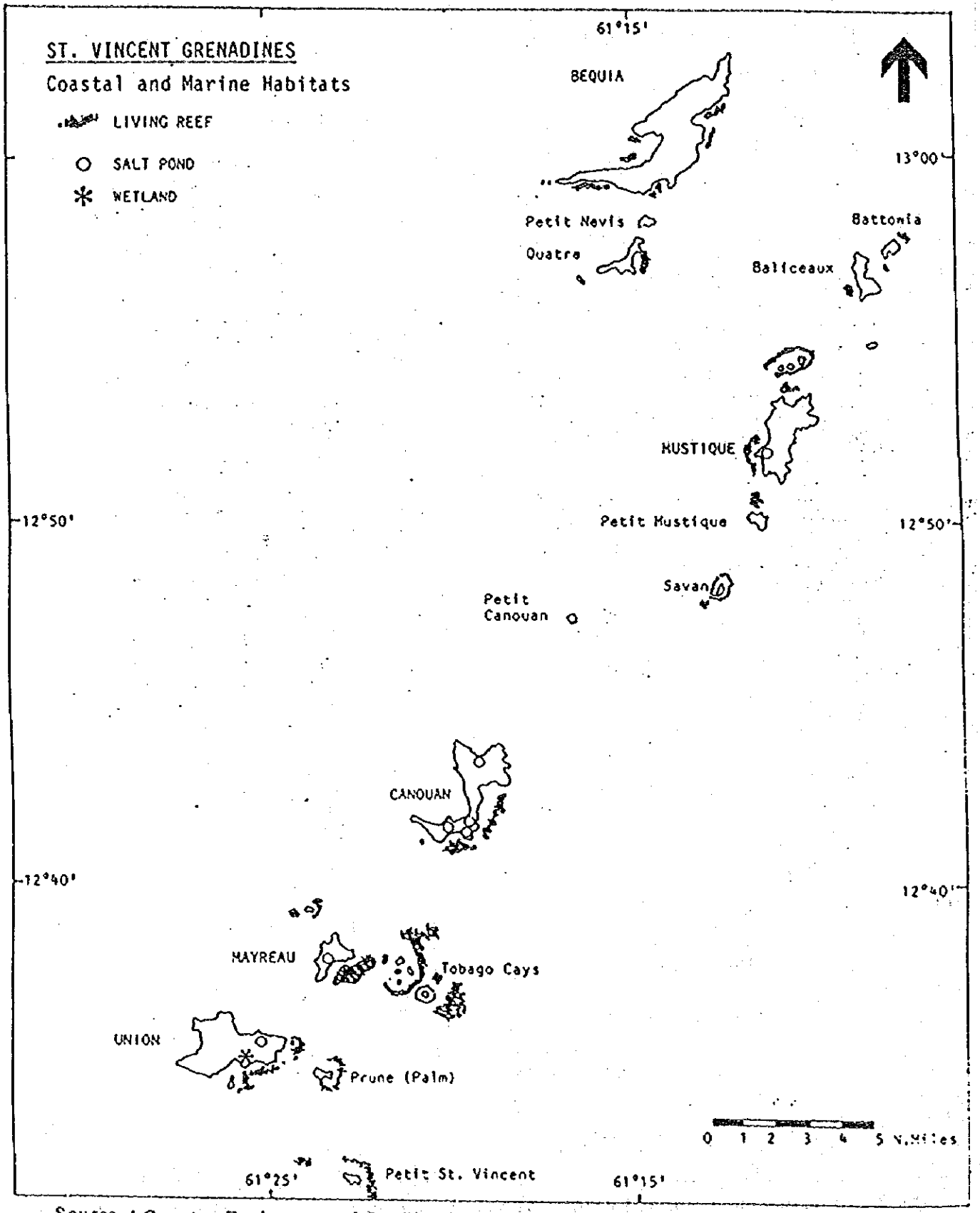
	English name	Scientific name	Diameter & height	No. of trees
1	Sea grape	Coccoloba uvifera	0.1~0.3m 5~8m	11
2	Purple Allamanda	Cryptostegia grandiflora R.Br.	2~5cm 1~3m	720
3	Sweet acacia	Acacia farnesiana (L)wild	2~10cm 1~4m	720
4	Wite Cedar	Tabebuia heterophlla (D.C.)Britton	0.12m 4m	1
5	Camitillo verde (similar species)	Micropholis garciniaefolia Pierre	0.3m 8m	1

Fig-1. Coral Reef Distribution at St. Vincent



Source : Country Environmental Profile, St.Vincent & the Grenadines, 1991(Calvin A. Howel)

Fig-2. Coral Reef Distribution at the Grenadines



Source : Country Environmental Profile, St.Vincent & the Grenadines, 1991(Calvin A. Howel)

Fig-3. Calliaqua Area Sea Chart

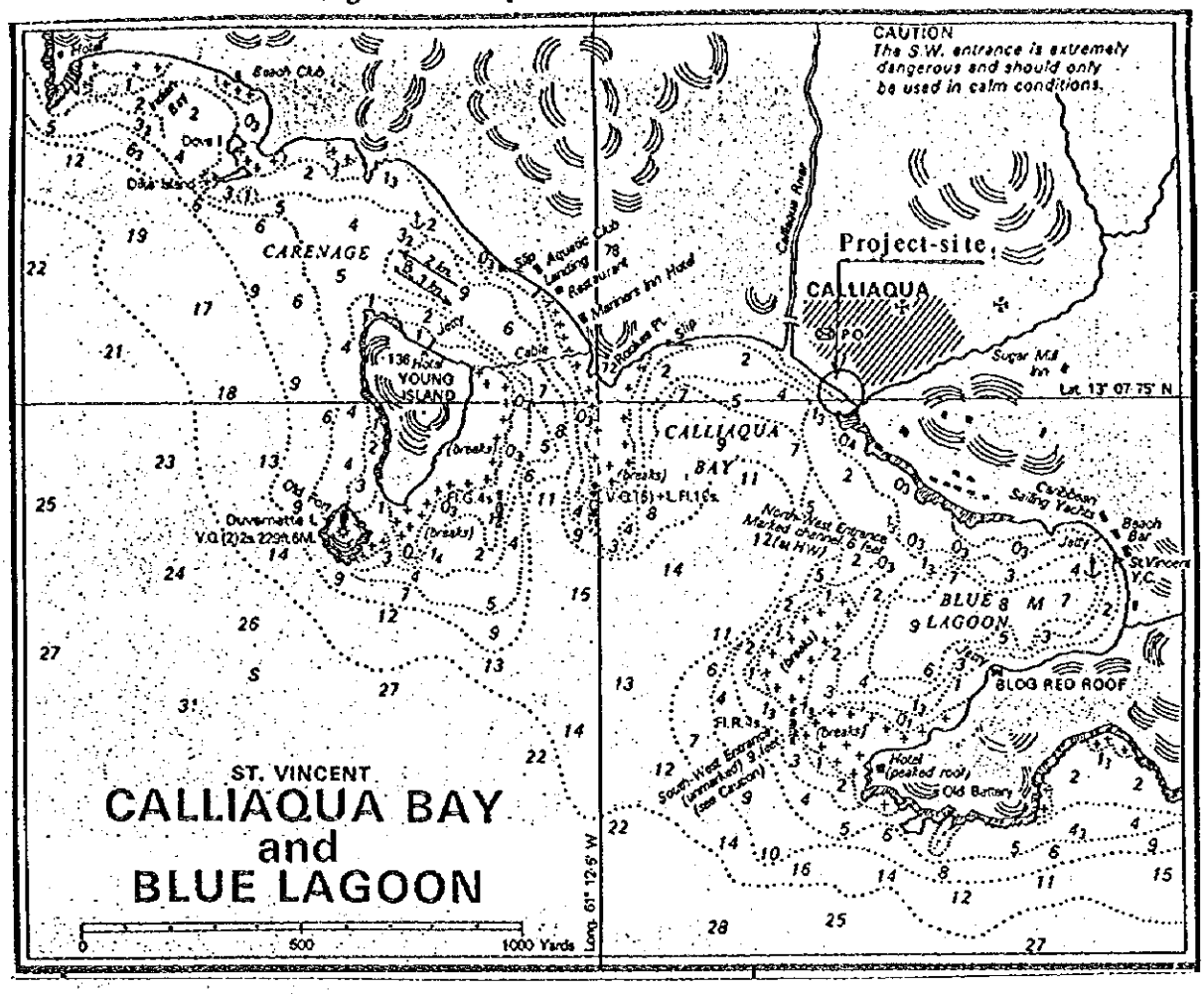
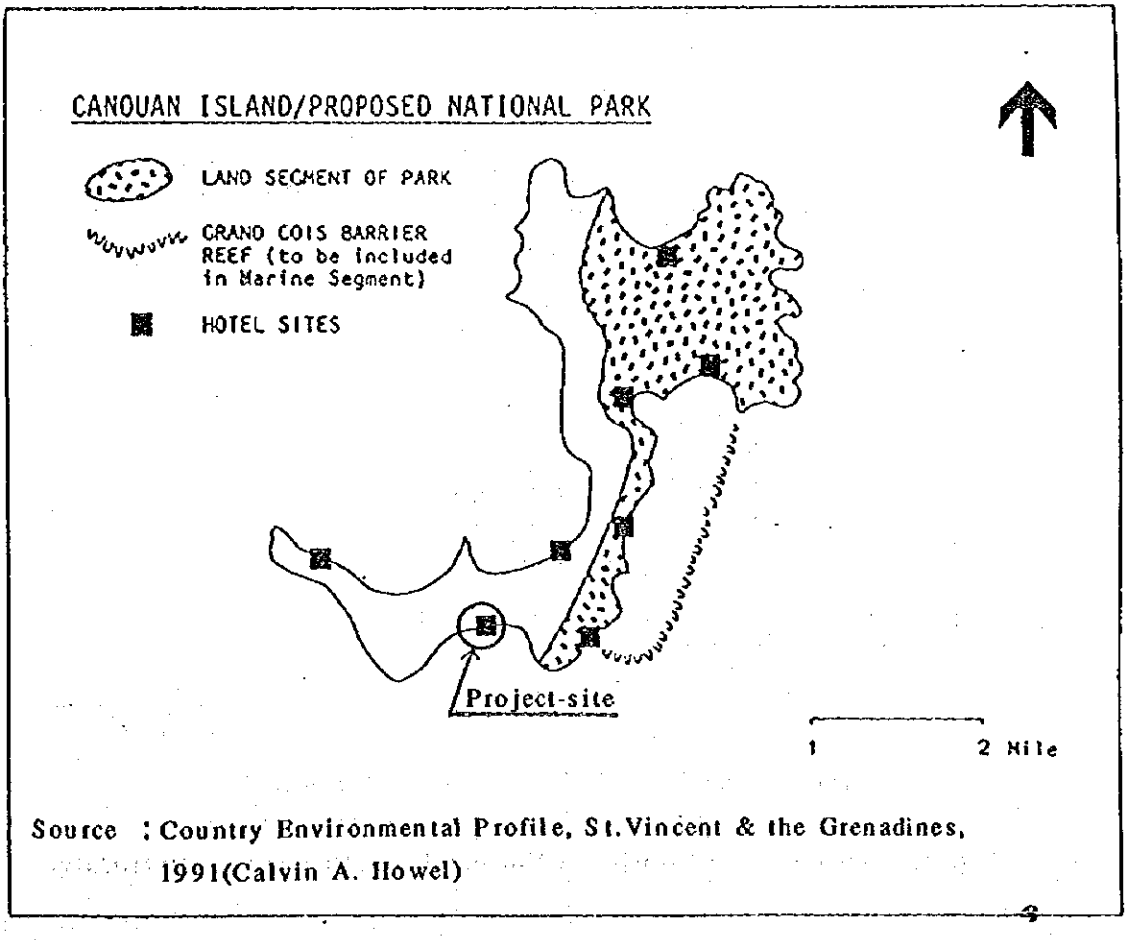
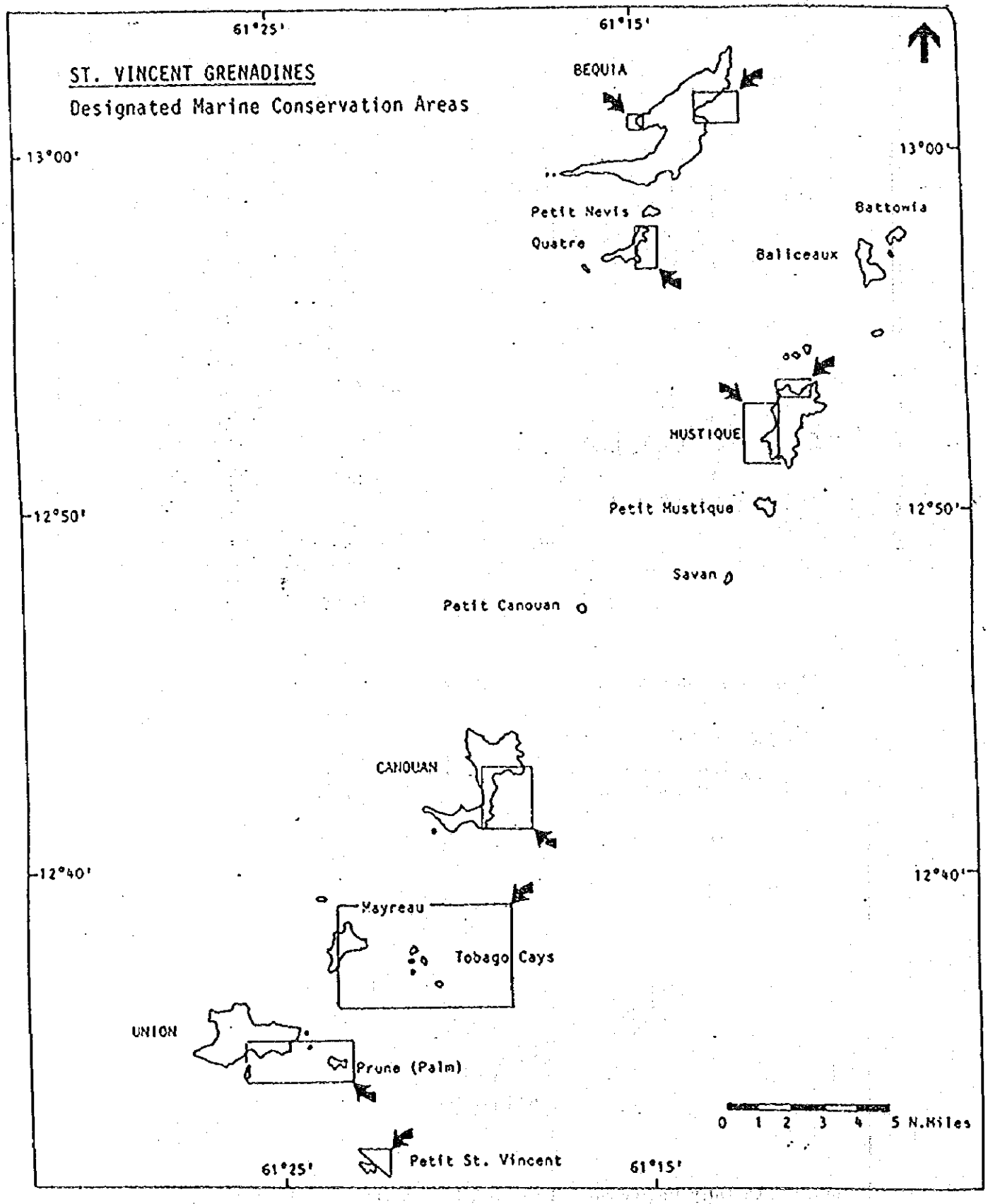


Fig-4. Proposed National Park at Canouan Island



Source : Country Environmental Profile, St.Vincent & the Grenadines, 1991(Calvin A. Howel)

Fig-5. Designated Marine Conservation Areas at St. Vincent & the Grenadin



Source : Country Environmental Profile, St.Vincent & the Grenadines, 1991(Calvin A. Howel)

5-6 Environmental Impact Study Results (according to the JICA environmental guidelines)

Table 1-1 Screening Format (for port construction projects) Calliaqua

(1/2)

Environmental factors			Contents	Assess-ment	Remarks
Social Environment	1	Transfer of residents	Transfer accompanying site take-over (conversion of resident and land ownership rights)	None	There is no privately owned land (structures)
	2	Economic activities	Loss of land and fishing ground, etc., and of the economic structural change	None	The facilities are small and will have no effect.
	3	Traffic and living facilities	Impact on existing traffic from congestion and accidents, etc. and impact on schools and hospitals, etc.	None	Same as above
	4	Isolation of the region	Isolation from local communities through traffic obstruction	None	There are no site conditions that may invite the isolation
	5	Ruins and cultural assets	Loss of or reduction in value of temples and buried cultural assets, etc.	None	No such things exist on the site or in its environs.
	6	Water rights and other rights	Obstruction to fishing rights, water rights and forests rights, etc.	None	There are no fishing grounds in front of the site and no works or facilities that may affect ocean waters
	7	Public sanitation	Deterioration of the sanitary conditions through generation of waste and harmful insects, etc.	None	Waste will be minimal and will be treated properly
	8	Waste products	Generation of waste materials and soil from construction work, waste oil and other general wastes	None	Garbage and waste will be small in quantity and public collection services will be utilized.
	9	Disaster (risk)	Increased risk of land collapse or shipping accidents, etc.	None	There are no generation factors.
Natural Environment	10	Topography and geology	Changes to valuable topography and geology through excavation and banking, etc.	None	Same as above
	11	Soil erosion	Washing away of surface soil due to rain following reclamation and forest destruction, etc.	None	Same as above
	12	Underground water	Drying-up and pollution caused by drains from excavation and leachate	None	Same as above
	13	Lakes and rivers	Changes to flow rates and river beds due to land filling or the inflow of drains	None	There are no lakes or rivers nearby.
	14	Coastline and ocean waters	Coastal erosion or accumulation caused by land filling or changes to the ocean conditions	None	There are no works or facilities that may have an effect.

(2/2)

Environmental factors			Contents	Assess-ment	Remarks
Natural Environment	15	Flora and fauna	Obstruction of growth or extinction of species caused by changes in the environment	None	There are no protected flora and fauna and no facilities that may have an impact.
	16	Climate	Changes in temperature and wind conditions caused by large scale reclamation or buildings	None	There are no generation factors.
	17	Landscape	Topographical changes caused by reclamation or the impedance of the scenic harmony by buildings	None	Current situation will be improved.
Pollution	18	Air pollution	Pollution caused by exhaust fumes and harmful gases from vehicles or shipping	None	There are no generation factors
	19	Water pollution	Pollution caused by the inflow of soil or industrial wastewater, etc.	None	Current situation will be improved.
	20	Soil pollution	Dust and pollution from insecticides, etc.	None	There are no generation factors.
	21	Noise and vibration	Generation of noise and vibration from the passage of vehicles and shipping, etc.	None	Same as above
	22	Cave-in	Cave-in caused by change of soil conditions or lowering of underground water level	None	Same as above
	23	Odor	Generation of exhaust gases or odorous substances from the port facilities	None	Scale of facilities is small and odors will not be generated.
Overall assessment: Is it a project that requires IEE or EIA?				No	There are no items of impact.

Table 1-2 Screening Format (Port) Canouan

(1/2)

Environmental factors			Contents	Assess-ment	Remarks
Social Environment	1	Transfer of residents	Transfer accompanying site take-over (conversion of resident and land ownership rights)	None	There is no privately owned land (structures).
	2	Economic activities	Loss of land and fishing ground production opportunities, etc. or changing of the economic structure	None	The facilities are small and will have no effect.
	3	Traffic and living facilities	Impact on existing traffic from congestion and accidents, etc. and impact on schools and hospitals, etc.	None	Same as above
	4	Isolation of the region	Division of local communities through traffic obstruction	None	There are no site conditions that may invite isolation
	5	Ruins and cultural assets	Loss of or reduction in value of temples and buried cultural assets, etc.	None	There are no such things.
	6	Water rights and other rights	Obstruction of fishing rights, water rights and right of common entry to mountains and forests, etc.	None	There are no fishing grounds in front of the site
	7	Public sanitation	Deterioration of the sanitary environment through generation of waste and harmful insects, etc.	None	Waste will be minimal and will be treated properly
	8	Waste products	Generation of waste construction materials, left over earth, waste oil and other general waste products, etc.	None	Same as above
	9	Disaster (risk)	Increased risk of ground subsidence or shipping accidents, etc.	None	There are no generation factors.
Natural Environment	10	Topography and geology	Changes to valuable topography and geology through excavation and banking, etc.	None	Same as above
	11	Soil erosion	Washing away of surface soil due to rain following reclamation and forest destruction, etc.	None	Same as above
	12	Underground water	Pollution caused by wastewater from excavation and leachate	None	Same as above
	13	lakes and rivers	Changes to flow rates and river beds due to land filling or the inflow of wastewater	None	Same as above
	14	Coastline and ocean waters	Coastal erosion or accumulation caused by land filling or changes to the ocean conditions None	None	There are no facilities that may have an effect.

(2/2)

Environmental factors			Contents	Assess-ment	Remarks
Natural Environment	15	Flora and fauna	Obstruction of growth or extinction of species caused by changes in the living environment	None	There are no protected flora and fauna.
	16	Climate	Changes in temperature and wind conditions caused by large scale reclamation or buildings	None	There are no generation factors.
	17	Landscape	Topographical changes caused by reclamation or the impedance of the scenic harmony by buildings	None	Same as above
Pollution	18	Air pollution	Pollution caused by exhaust fumes and harmful gases from vehicles or shipping	None	Same as above
	19	Water pollution	Pollution caused by the inflow of soil or industrial wastewater, etc.	None	Proper treatment will be done in septic tanks.
	20	Soil pollution	Dust from open piling or pollution from agricultural fertilizers, etc.	None	There are no generation factors.
	21	Noise and vibration	Generation of noise and vibration from the passage of vehicles and shipping, etc.	None	Same as above
	22	Cave-in	Ground surface subsidence caused by changed geological conditions or lowering of the groundwater level	None	Same as above
	23	Odor	Generation of exhaust gases or odorous substances from the port facilities	None	As generated quantities will be small, it will be treated properly.
Overall assessment: Is it a development project that requires implementation of IEE or EIA?				No	

Table 2-1 Scoping Checklist (for port construction projects) Calliaqua

Environmental factors			Assess-ment	Remarks
Social Environment	1	Transfer of residents	D	There is no privately owned land. A restaurant exists on the site, however, this will be continued unchanged.
	2	Economic activities	"	There are no fishing grounds in front of the site and there will be no impact because the existing facilities will be improved.
	3	Traffic and living facilities	"	Traffic and living facilities Same as above
	4	Isolation of the region	"	There are no site conditions that may invite isolation of the region
	5	Ruins and cultural assets	"	There are no such things on the site or in its environs.
	6	Water rights and other rights	"	There are no fishing grounds near the site and no facilities that may have an impact.
	7	Public sanitation	"	Waste will be minimal and it will either be incinerated or collected.
	8	Waste products	"	Fish waste can be considered, however, the generated quantities will be small.
	9	Disaster (risk)	"	No major changes will occur and the scale of facilities will be small.
Natural Environment	10	Topography and geology	"	There are no protected areas and no major changes will occur.
	11	Soil erosion	"	No major changes to the land will occur.
	12	Underground water	"	There are no pumping facilities (wells).
	13	lakes and rivers	"	There are no lakes or rivers nearby.
	14	Coastline and ocean waters	"	There are no works or facilities that may have an effect.
	15	Flora and fauna	"	There are no protected flora and fauna and no works or facilities that may have an impact.
	16	Climate	"	There are no generation factors.
	17	Landscape	"	As the current situation will be improved, there will be no major changes.
Pollution	18	Air pollution	"	There are no generation factors.
	19	Water pollution	"	The current situation will be improved.
	20	Soil pollution	"	There are no generation factors.
	21	Noise and vibration	"	Same as above
	22	Cave-in	"	Same as above
	23	Odor	"	The scale of facilities is small and odor will not be generated.

(Note) A: A major impact is foreseen.
B: Some impact is foreseen.
C: Unclear (examination is required and, if an impact becomes clear in the course of the investigations, this shall be given consideration).
D: Because hardly any impact can be foreseen, IEE or EIA shall not be necessary.

Table 2-2 Scoping Checklist (Port) Canouan

Environmental factors			Assess-ment	Remarks
Social Environment	1	Transfer of residents	D	There is no privately owned land.
	2	Economic activities	"	The scale of the facilities is small and they will have no impact on the surroundings.
	3	Traffic and living facilities	"	Same as above
	4	Isolation of the region	"	There are no private houses, etc. and no site conditions that may invite isolation of the region
	5	Ruins and cultural assets	"	There are no such things.
	6	Water rights and other rights	"	There are no fishing grounds in front of the site and no facilities that may have an impact.
	7	Public sanitation	"	As waste will be minimal, it will be incinerated.
	8	Waste products	"	Fish waste will be fed to seagulls and all combustibles will be incinerated.
	9	Disaster (risk)	"	No major changes will occur and no large facilities will be built.
Natural Environment	10	Topography and geology	"	Same as above
	11	Soil erosion	"	Same as above
	12	Underground water	"	There are no pumping facilities (wells).
	13	lakes and rivers	"	There are no lakes or rivers nearby.
	14	Coastline and ocean waters	"	There are no works or facilities that may have an effect. For example, the jetty will be a pile structure.
	15	Flora and fauna	"	There are no protected flora and fauna and this matter has been surveyed.
	16	Climate	"	There are no generation factors of scale that may have an impact.
	17	Landscape	"	Same as above
Pollution	18	Air pollution	"	Same as above
	19	Water pollution	"	Effluent will be treated to B.O.D 25 ppm or less in septic tanks.
	20	Soil pollution	"	There are no generation factors.
	21	Noise and vibration	"	Same as above
	22	Cave-in	"	Same as above
	23	Odor	"	Because only minor quantities of fish offal will be generated, it will be treated properly by feeding to seagulls.

(Note) A: A major impact is foreseen.
B: Some impact is foreseen.
C: Unclear (examination is required and, if an impact becomes clear in the course of the investigations, this shall be given consideration).
D: Because hardly any impact can be foreseen, IEE or EIA shall not be necessary.

6. Cost Estimation borbe by the Recipient Country

The breakdown of costs to be borne by the government of St. Vincent and the Grenadines.

①	Existing structure removal works	Approx. EC$100,000 (3.4 million yen)
②	Power and water supply line laying	Approx. EC$100,000 (3.4 million yen)
③	Installation of fence around site, etc.	Approx. EC$100,000 (3.4 million yen)
	Total	Approx. EC$300,000 (10.2 million yen)

Incidentally, the project for construction of the road up to the site on Canouan is being implemented through a loan from the Caribbean Development Bank and is scheduled for completion in October 1996.


JICA