

**ENVIRONMENTALLY SOUND WATER AND WASTEWATER PROVISION AT  
THE COMMUNITY LEVEL IN THE CARIBBEAN**

United Nations Environment Programme Workshop  
27 – 30 november 2007, Kingston-Jamica

**Status of Sewage Needs Pilot Assessments  
in  
Panama**

by

**Belgis Chial Z.**

Chief of the Environmental Quality Laboratory  
National Authority of Environment (ANAM) of Panama

# INTER-INSTITUTIONAL COMMITTEE

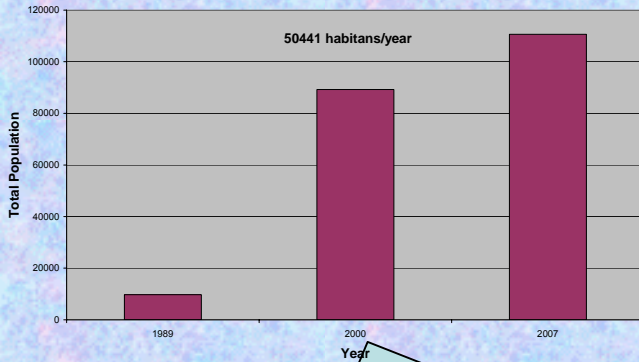
## May 2007



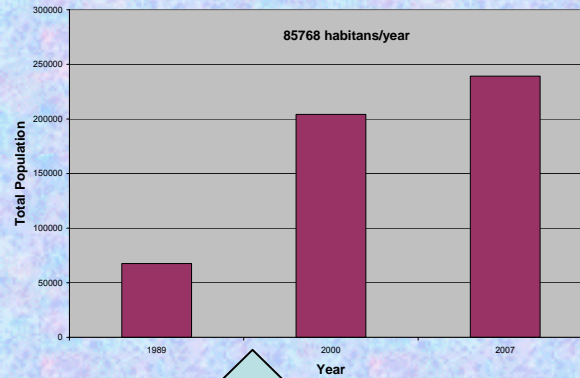
- MINISTRY OF PUBLIC HEALTH (MINSA).
- NATIONAL INSTITUTE OF SEWERS AND DRINKING WATER (IDAAN).
- NATIONAL AUTHORITY OF ENVIRONMENT (ANAM).
- MARITIME AUTHORITY OF PANAMA (AMP).
- PANAMANIAN INSTITUTE OF ART AND TURISM (IPAT).

# POPULATION AND GROWTH TENDENCY

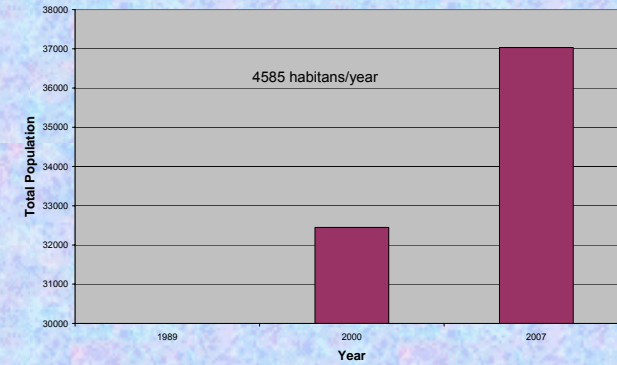
POPULATION TENDENCY IN THE PROVINCE OF BOCAS DEL TORO




POPULATION TENDENCY IN THE PROVINCE OF COLON



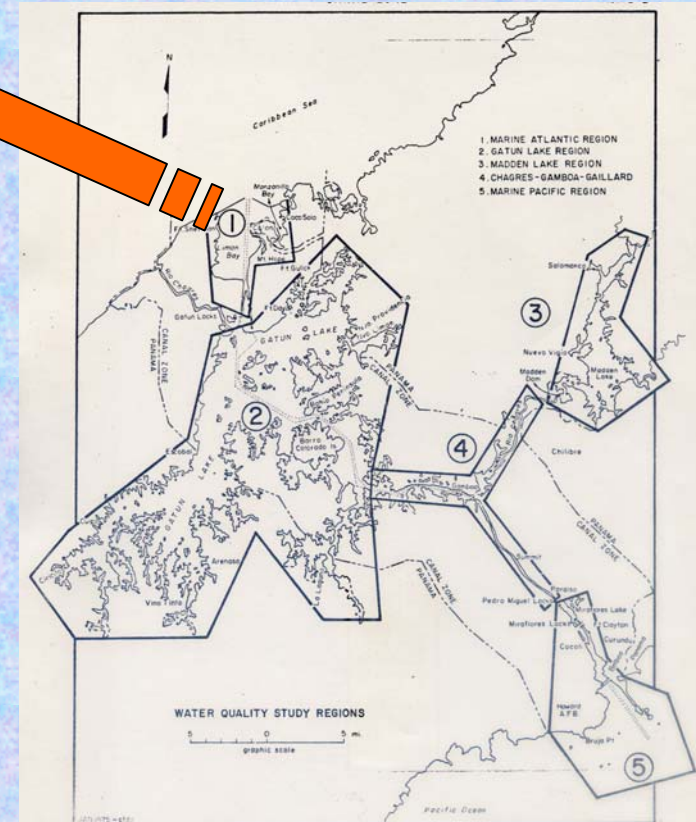
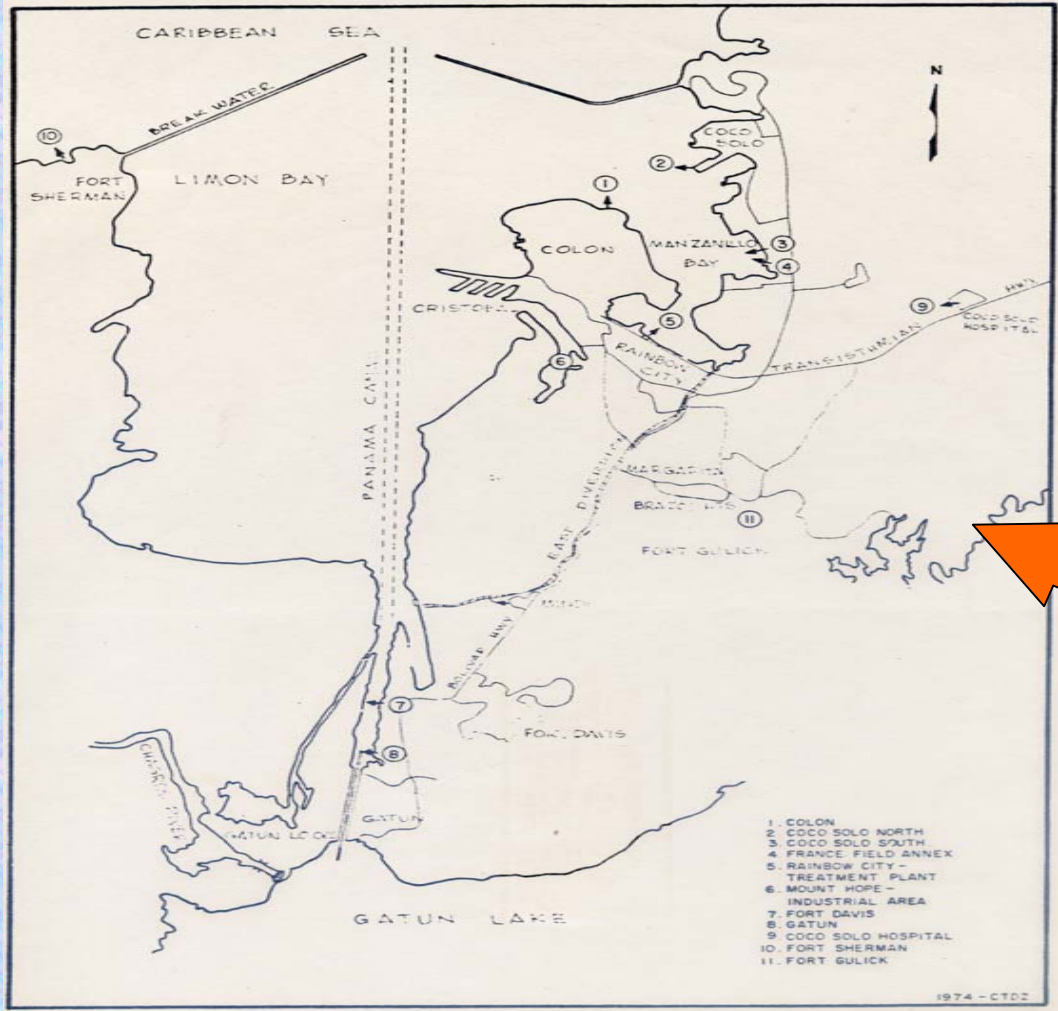
POPULATION TENDENCY IN THE PROVINCE OF SAN BLAS



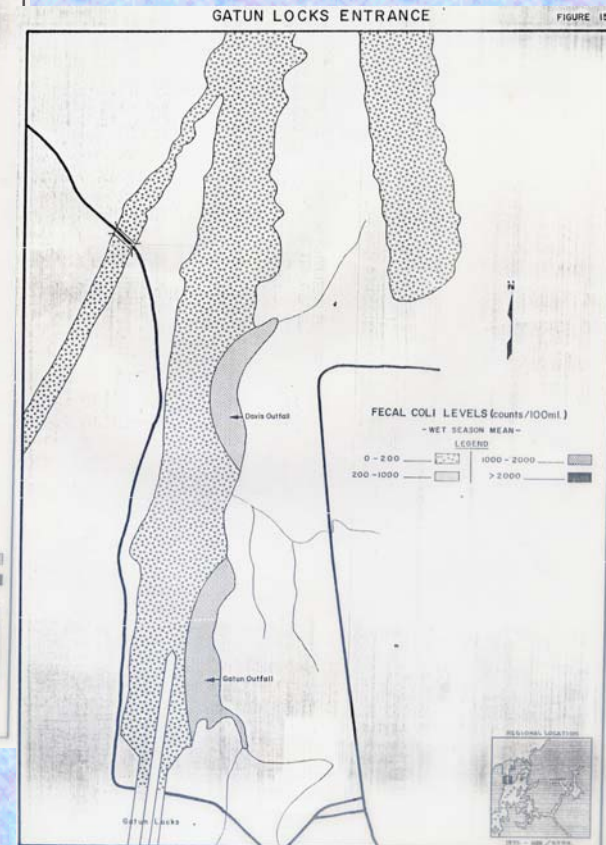
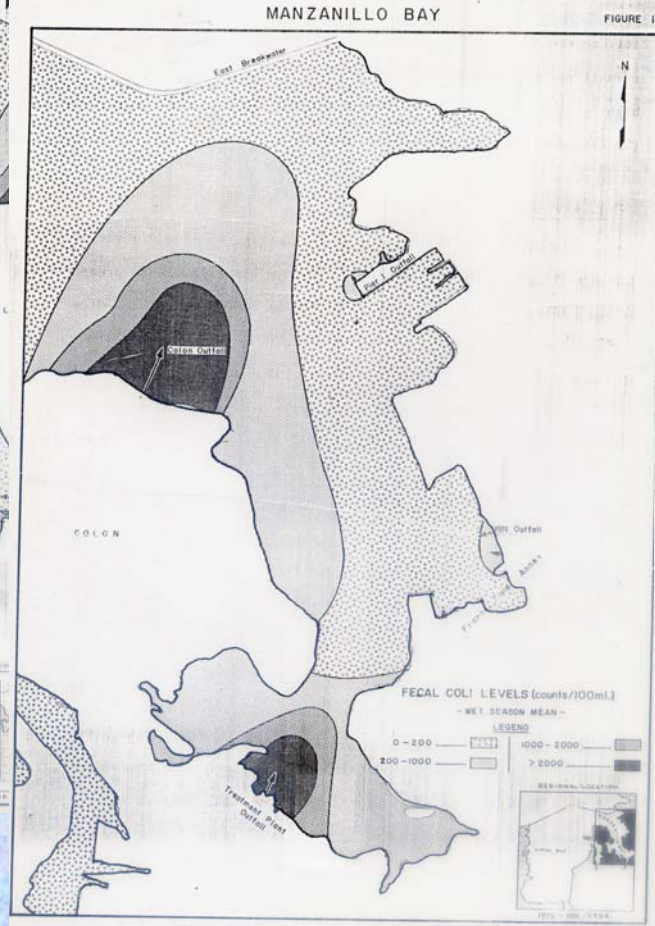
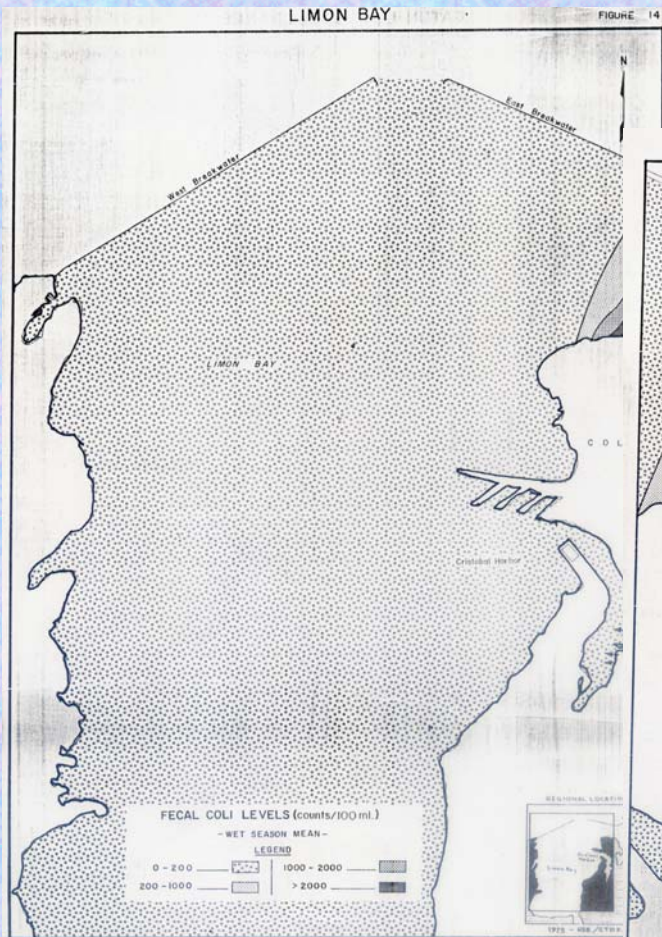
# DISCHARGE AND WATER QUALITY IN THE CITY OF COLON

- Comprised:
  - Area inside the Limon Bay breakwater and all tributaries leading into it . 
  - All Atlantic side of the Panama Canal Communities.
  - City of Colon.
  - Gatun Locks Entrance Channel.
  - Land between the coast and Gatun Lake.

# WASTE DISCHARGE OF TARGETED AREA



# ISOGRAM FOR FECAL COLI LEVELS



# CONCENTRATION LEVELS PARAMETERS IN EFFLUENTS

AVERAGE CONCENTRATION LEVELS- ATLANTIC EFFLUENTS - DRY SEASON

PARAMETER	UNIT	DAVIS	GATUN	GULICK	COCO SOLO NORTH	COCO SOLO SOUTH	RAINBOW CITY
BOD	p.p.m			94	26		50
COD	p.p.m			173	348	248	161
TOC	p.p.m				23	36	40
Kjeldahl Nitrogen	p.p.m			15	13	10	14
Ammonia Nitrogen	p.p.m			10.8	9.2	7.5	9.4
Total Phosphorus	p.p.m			4.1			3.7
Total solids	p.p.m			855	11240	4124	3527
Settl. solids	ml/l			2.9	0.6	0	0.3
Susp. solids	p.p.m			70	39	28	45
Diss. solids	p.p.m			509	10858	4001	3353
Vol. solids	p.p.m			373	2241	992	885

Table 12

AVERAGE CONCENTRATION LEVELS- ATLANTIC EFFLUENTS - WET SEASON

PARAMETER	UNIT	DAVIS	GATUN	GULICK	COCO SOLO NORTH	COCO SOLO SOUTH	RAINBOW CITY
BOD	p.p.m	92	97	50	25	27	46
COD	p.p.m	286	409	170	353		211
TOC	p.p.m	43	58	26	16	18	25
Kjeldahl Nitrogen	p.p.m	22	33	11	12	16	10
Ammonia Nitrogen	p.p.m	16.5	26.4	8.7	7.1	7.4	7.8
Total Phosphorus	p.p.m	3.9	7.7	2.7	2.1	2.7	2.0
Total solids	p.p.m	291	378	264	4944	1977	2225
Settl. solids	ml/l	5.5	8.5	0.4	0.3	0.3	0.3
Susp. solids	p.p.m	90	89	28	30	15	25
Diss. solids	p.p.m	262	284	177	5526	2288	3159
Vol. solids	p.p.m	119	168	83	1003		477

AVERAGE LOADINGS - ATLANTIC EFFLUENTS - DRY SEASON

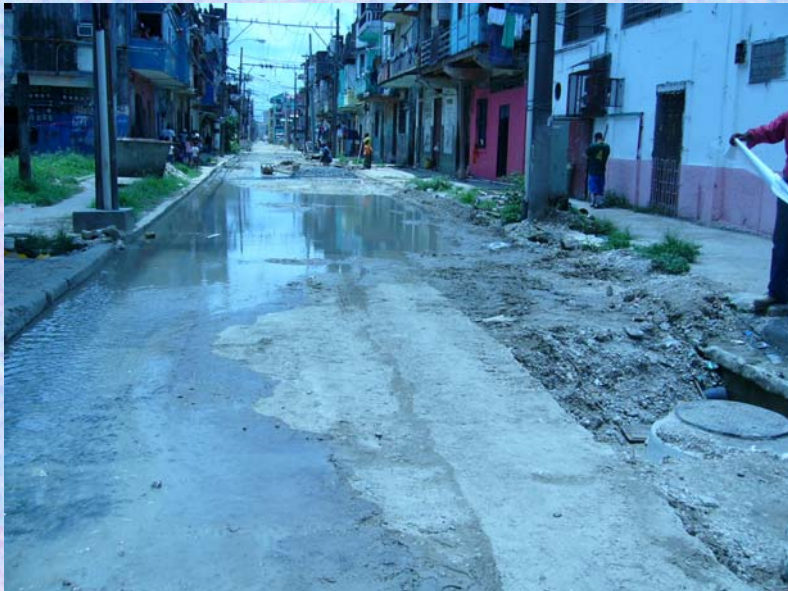
PARAMETER	UNIT	DAVIS	GATUN	GULICK	COCO SOLO NORTH	COCO SOLO SOUTH	RAINBOW CITY
BOD	lbs/day			409	61	33	512
COD	lbs/day			738	749		
TOC	lbs/day				55	45	403
Kjeldahl Nitrogen	lbs/day			65	28	12	138
Ammonia Nitrogen	lbs/day			42	21	9	90
Total Phosphorus	lbs/day			18			36
Total solids	lbs/day			3256	23768	5187	32634
Settl. solids	lbs/day						
Susp. solids	lbs/day			284	84	18	421
Diss. solids	lbs/day			1954	22952	2878	31023
Vol. solids	lbs/day			1415	4720	1248	8136

Table 14

AVERAGE LOADINGS - ATLANTIC EFFLUENTS - WET SEASON

PARAMETER	UNIT	DAVIS	GATUN	GULICK	COCO SOLO NORTH	COCO SOLO SOUTH	RAINBOW CITY
BOD	lbs/day	448	142	249	68		506
COD	lbs/day	1397	606	757	859		2737
TOC	lbs/day	215	86	123	46	22	396
Kjeldahl Nitrogen	lbs/day	109	49	52	32	20	112
Ammonia Nitrogen	lbs/day	82	39	40	23	9	85
Total Phosphorus	lbs/day	19	11	13	5.7	3.3	26
Total solids	lbs/day	1484	548	1296	13784	2487	24551
Settl. solids	lbs/day						
Susp. solids	lbs/day	441	127	146	87	35	357
Diss. solids	lbs/day	884	411	826	15023	5033	23570
Vol. solids	lbs/day	585	241	414	3134		4933

# SEWER SYSTEM COLLAPSED ON THE TARGET AREA



# ACTUAL STATUS OF THE PROJECT

- An agreement has been performed between the National Authority of Environment (ANAM), Centre of Tropical Humid for Latin-American and Caribbean (CATHALAC) and the Program of United Nation (PNUMA-UCR/CAR), where:
  - **CATHALAC:** will manage the funds and hire the Consultants to carry out the project based on reference terms and procedures in agreement with ANAM.
  - **ANAM:** will administrate the consultancy concerning to technical and scientific issues.
  - **PNUMA:** will supervise the execution of the project to guarantee the coordination and organization.
- PNUMA has released fifteen thousand dollars (USD 15000) to CATHALAC to initiate the process of the consultancy hiring.
- ANAM has created and presented the corresponding “Terms of Reference” to be fulfilled by the consultants.
- Is expected to start the project at the beginning of January 2008 and ending it not more than 8 months later (August 2008).