IMPROVING LAND-USE FOR INTEGRATED CLIMATE ACTION: AN APPROACH TAKEN AT THE LOCAL LEVEL IN THE PHILIPPINES – THE SANTA ROSA EXPERIENCE -

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City-ENRO
LoCARNet 3rd Annual Meeting
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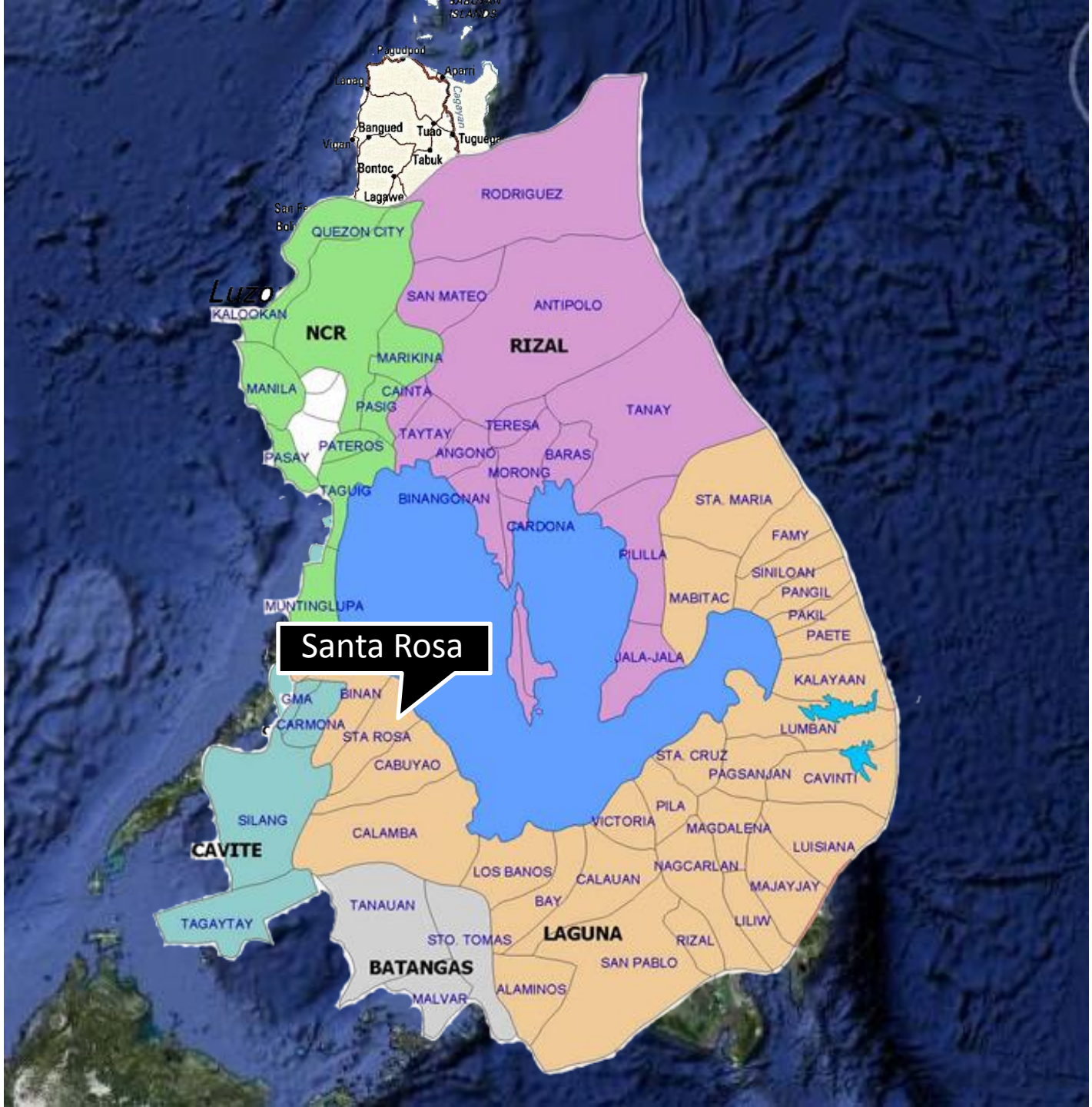
Luzon
Pagudpod
Laoag
Aparri
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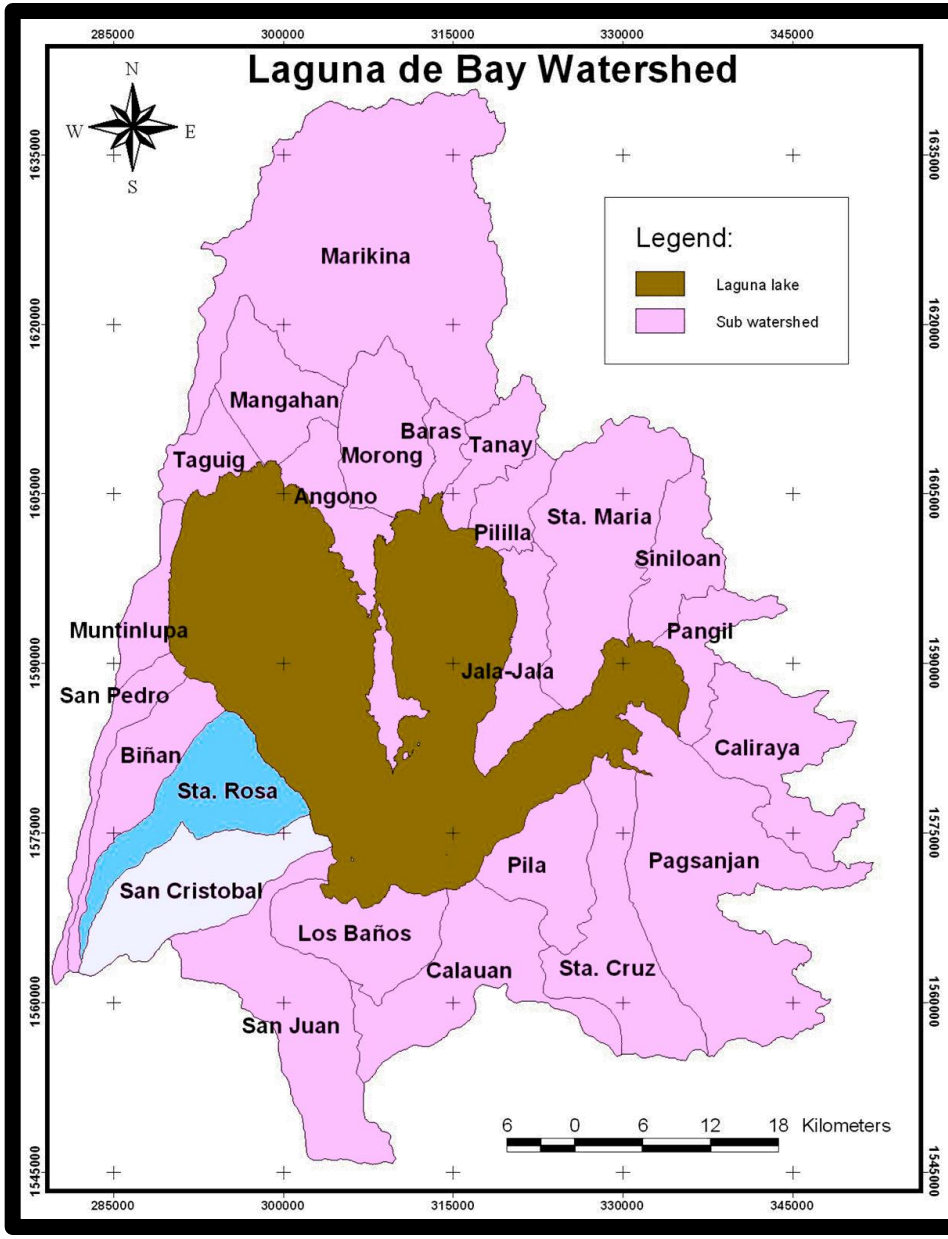
Vigan
Tabuk
Bontoc
Lagawe
RODRIGUEZ
QUEZON CITY
KALOOKAN
NCR
SAN MATEO
ANTIPOLO
RIZAL
MARIKINA
MANILA
CAINTA
PASIG
TANAY
TAYTAY
TERESA
PATEROS
PASAY
ANGONO
BARAS
MORONG
TAGUIG
BINANGONAN
STA. MARIA
CARDONA
FAMY
PILILLA
SINILOAN
MABITAC
PANGIL
PAKIL
PAETE
MUNTINGLUPA
Santa Rosa
JALA-JALA
KALAYAAN
GMA
BINAN
CARMONA
STA ROSA
LUMBAN
CABUYAO
STA. CRUZ
PAGSANJAN
CAVINTI
PILA
SILANG
CALAMBA
VICTORIA
MAGDALENA
CAVITE
LUISIANA
LOS BANOS
NAGCARLAN
CALAUAN
MAJAYJAY
BAY
TANAUAN
LILIW
TAGAYTAY
STO. TOMAS
LAGUNA
RIZAL
BATANGAS
SAN PABLO
ALAMINOS
MALVAR

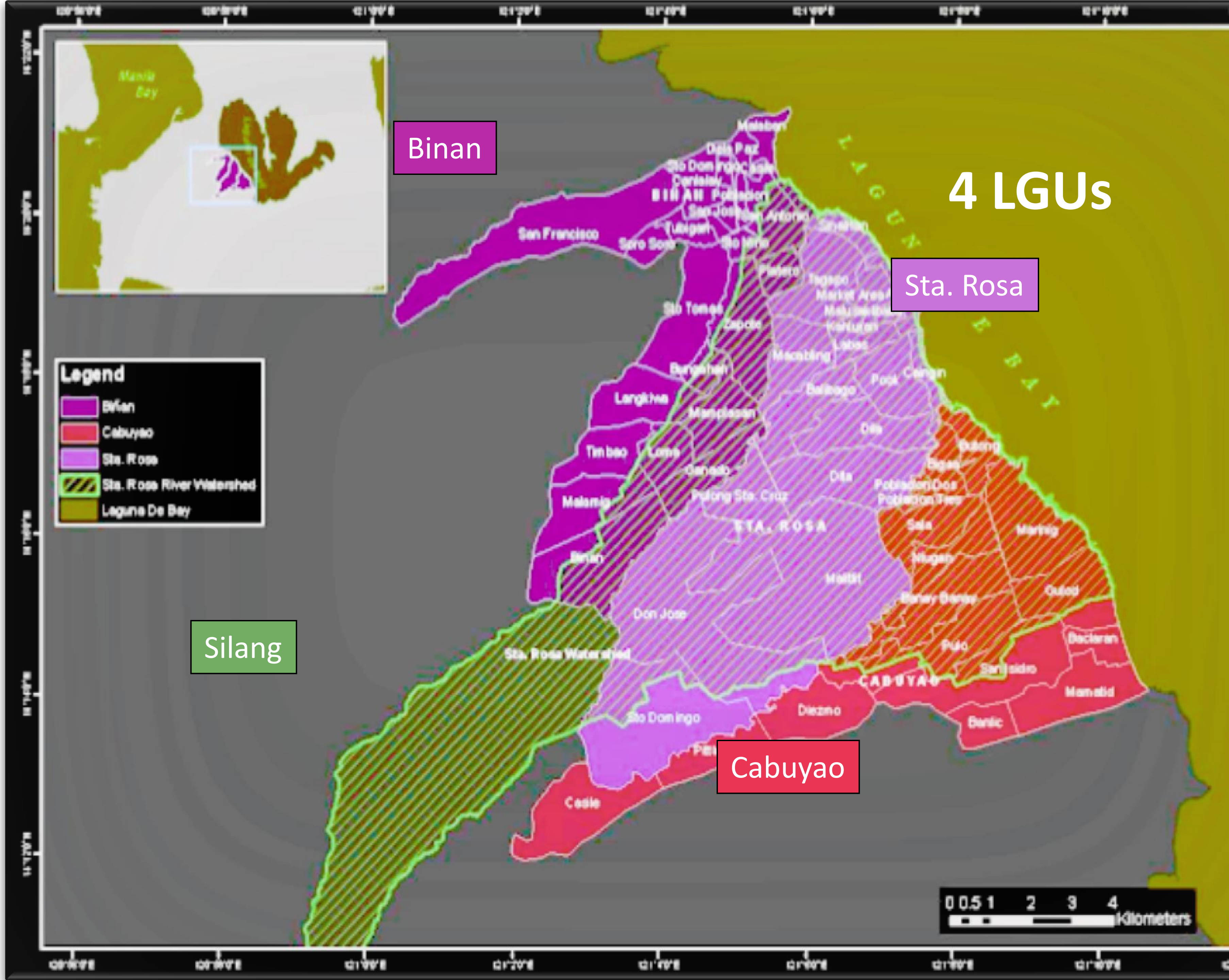
Hydrologic Setting

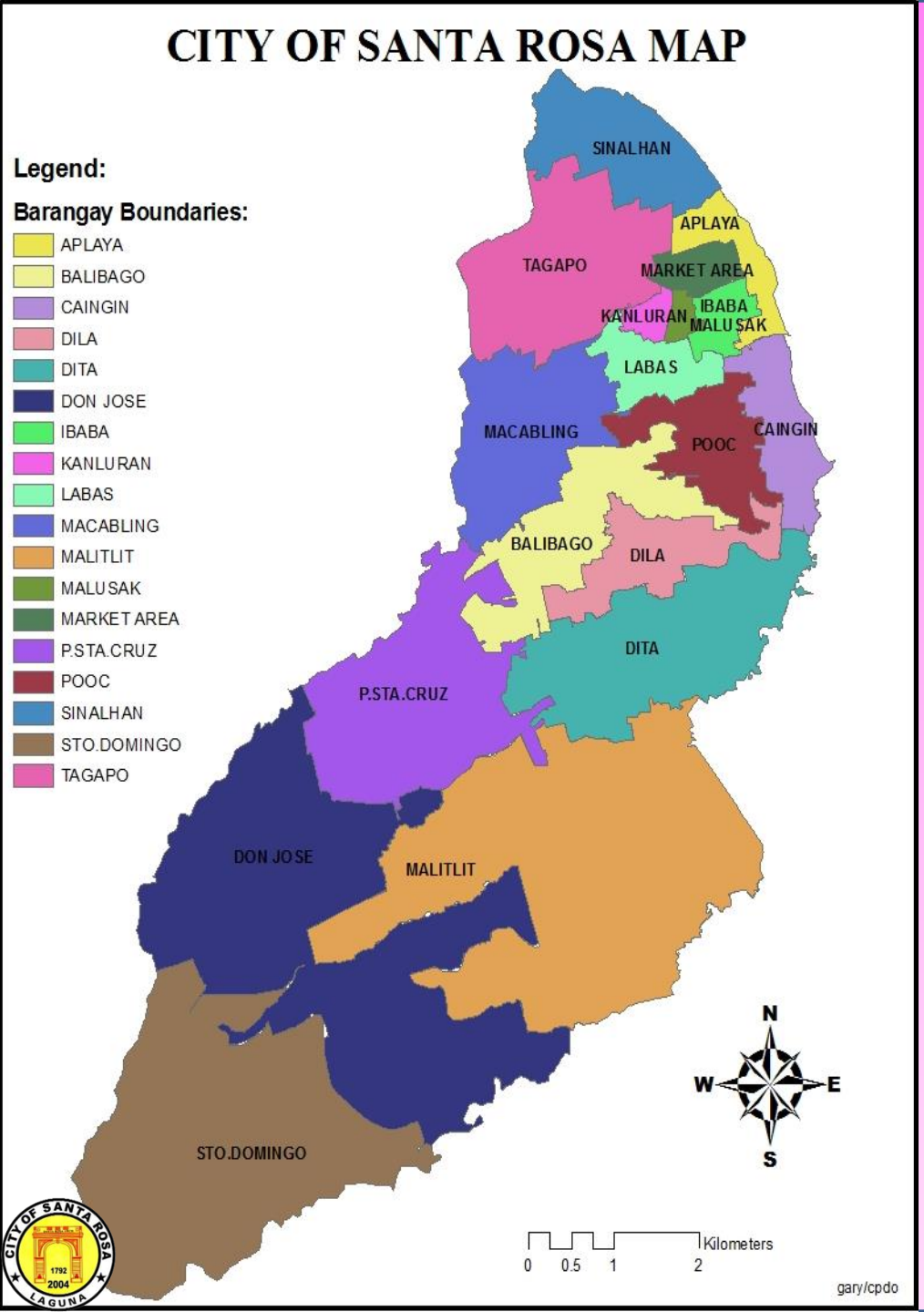
Laguna de Bay

24 River Basins

2,920 sq.km.




Binan
4 LGUs
Sta. Rosa
Silang
Cabuyao
Legend
Biñan
Cabuyao
Sta. Rosa
Sta. Rosa River Watershed
Laguna De Bay
LAGUNA DE BAY
Manila Bay
STA. ROSA
CABUYAO
Sta. Rosa Watershed
San Francisco
Langkiwa
Timbao
Malamig
Don Jose
Sto Domingo
Diezmo
Casile
Baclaran
Marinig
Pulo
Banic
0 0.5 1 2 3 4
Kilometers



GEOGRAPHICAL PROFILE

- **Land Area**: 5,549 Hectares

✓ It covers **3.2%** of the total land area of the Province of Laguna.

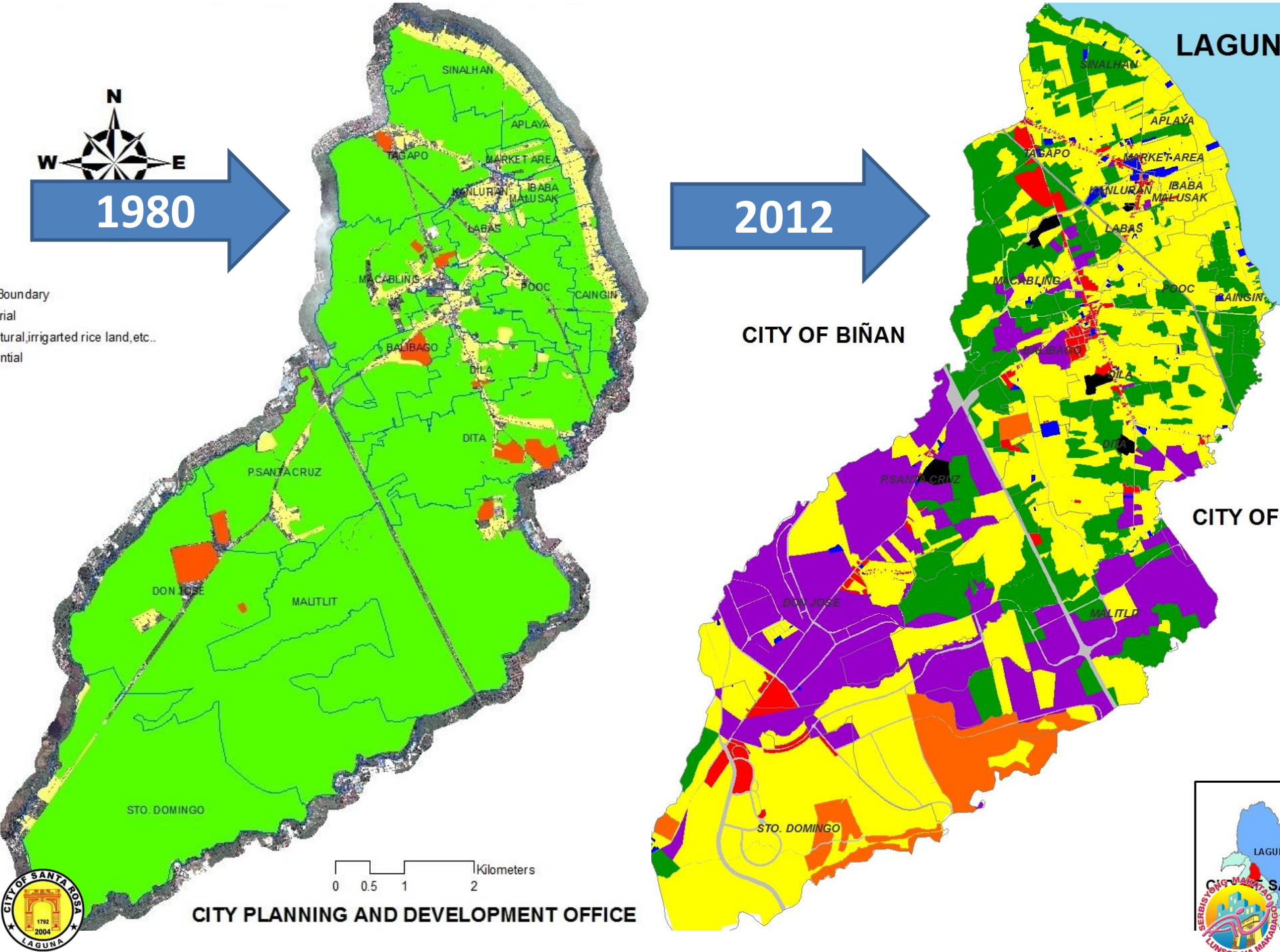
✓ It controls **37%** of the Santa Rosa Watershed

✓ Population 2010 : 284,670

- **Accessed via South Luzon Expressway (SLEX):**
  Mamplasan Exit
  Santa Rosa Exit
  Eton-Greenfield Exit

- **Accessibility:**
  South Luzon Expressway
  Manila South Road
  Philippine National Railway

- **Political Subdivision:**
  18 Barangays
  1st District of Laguna

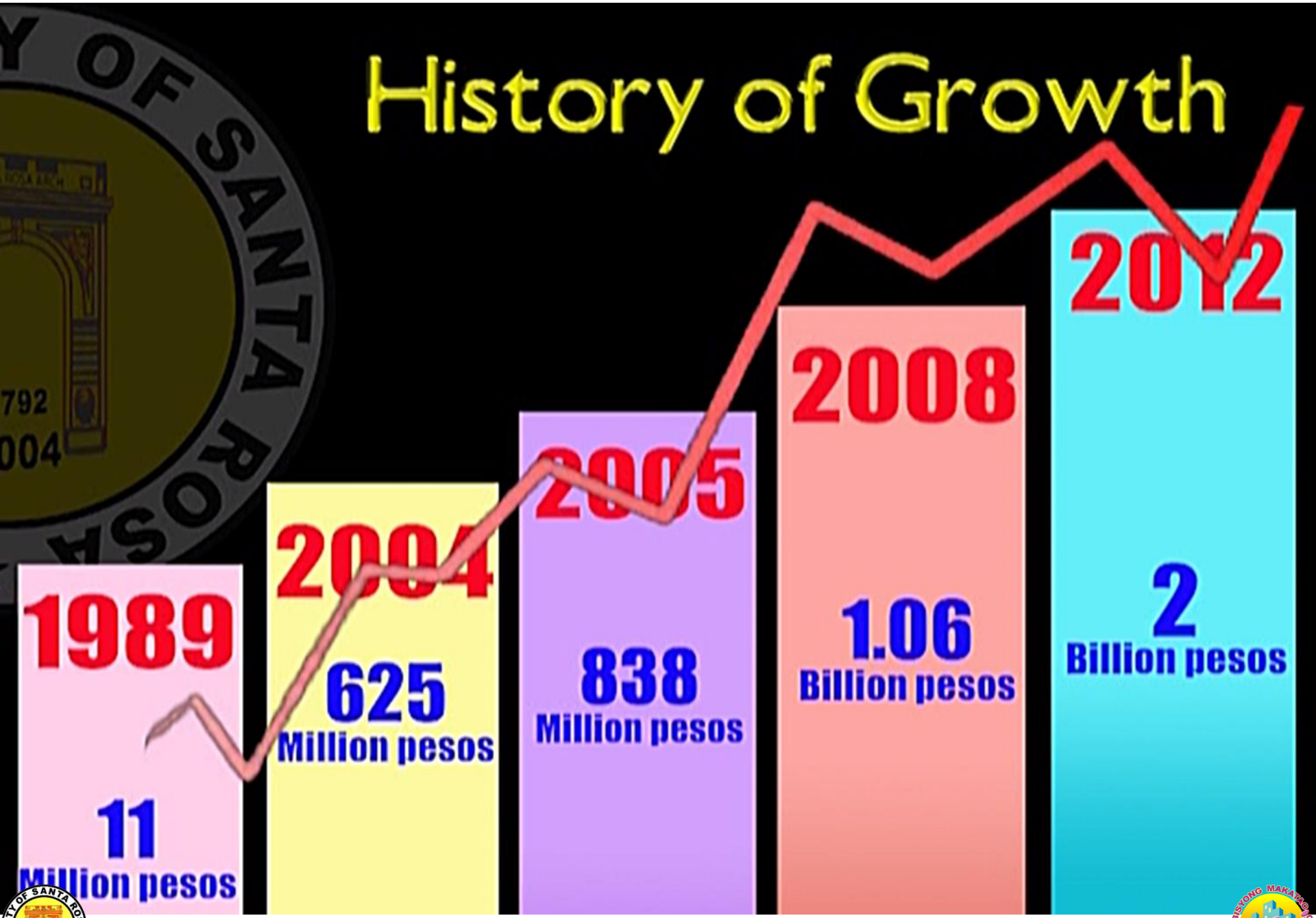

N
W
E
1980
2012
Boundary
rial
tural,irrigarted rice land,etc..
ntial
SINALHAN
APLAYA
TAGAPO
MARKET AREA
IBABA
MALUSAK
LABAS
MACABLING
POOC
CAINGIN
BALIBAGO
DILA
DITA
P.SANTACRUZ
DON JOSE
MALITLIT
STO. DOMINGO
Kilometers
0 0.5 1 2
CITY PLANNING AND DEVELOPMENT OFFICE
CITY OF BIÑAN
LAGUN
CITY OF

IDEAL BUSINESS ENVIRONMENT

CONVERGYS
Outthinking. Outdoing.

kgb

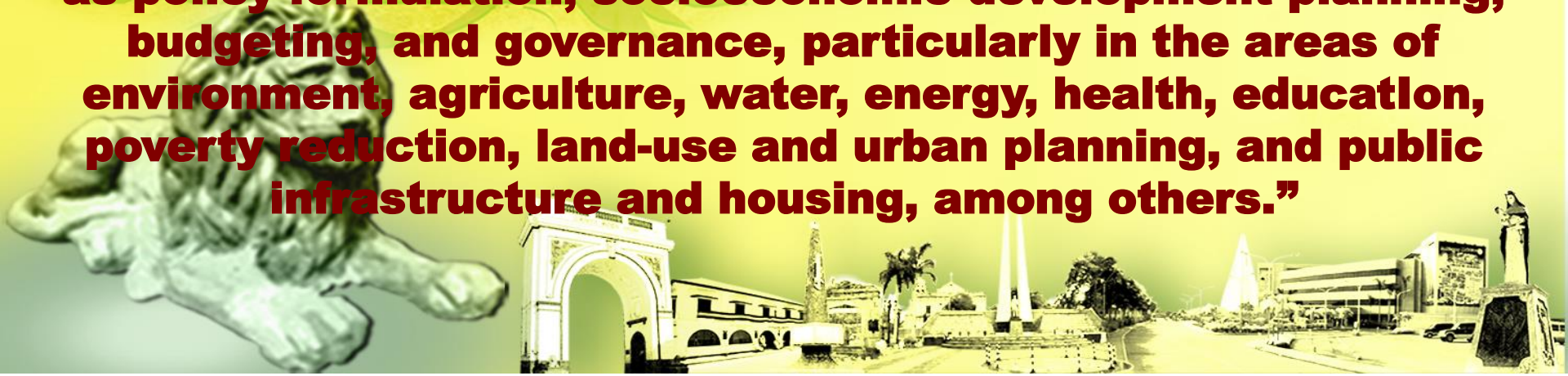
TeleTech


History of Growth
1989
11
Million pesos
2004
625
Million pesos
2005
838
Million pesos
2008
1.06
Billion pesos
2012
2
Billion pesos

Legal Mandates for Mainstreaming CCA and DRR

Republic Act 9729 or the Climate Change Act of 2009 - Section 14 on *Local Climate Change Action Plan states that* "The LGUs shall be the frontline agencies in the formulation, planning and implementation of climate change action plans in their respective areas, consistent with the provisions of the Local Government Code, the Framework, and the National Climate Change Action Plan

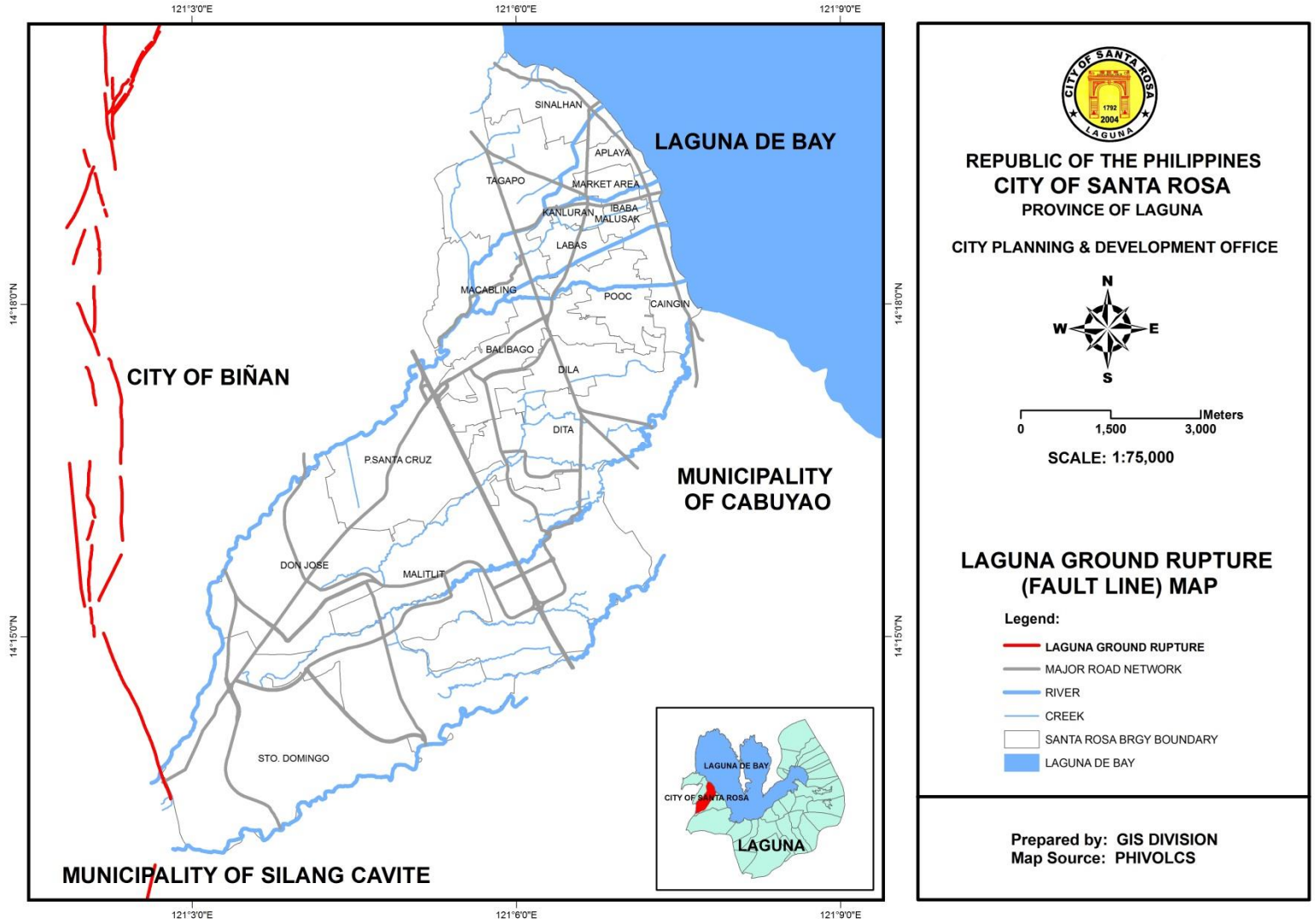
Republic Act 10121 or "Philippine Disaster Risk Reduction and Management Act of 2010 - section 2 "Mainstream disaster risk reductlon and climate change in development processes such as policy formulation, socioeconomic development planning, budgeting, and governance, particularly in the areas of environment, agriculture, water, energy, health, educatlon, poverty reduction, land-use and urban planning, and public infrastructure and housing, among others."



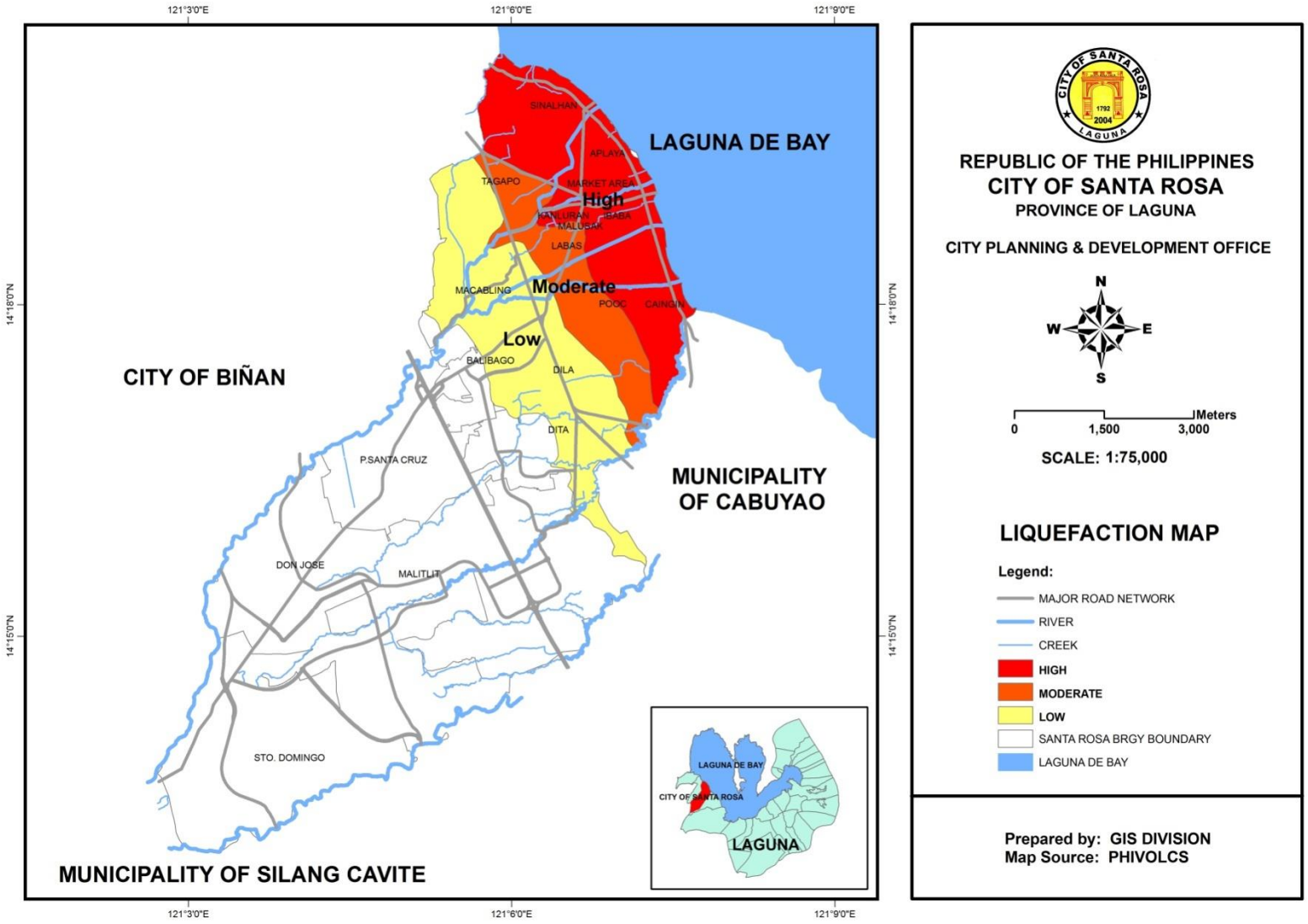
ACTIONS MADE BY THE CITY OF SANTA ROSA

RISK ASSESSMENT

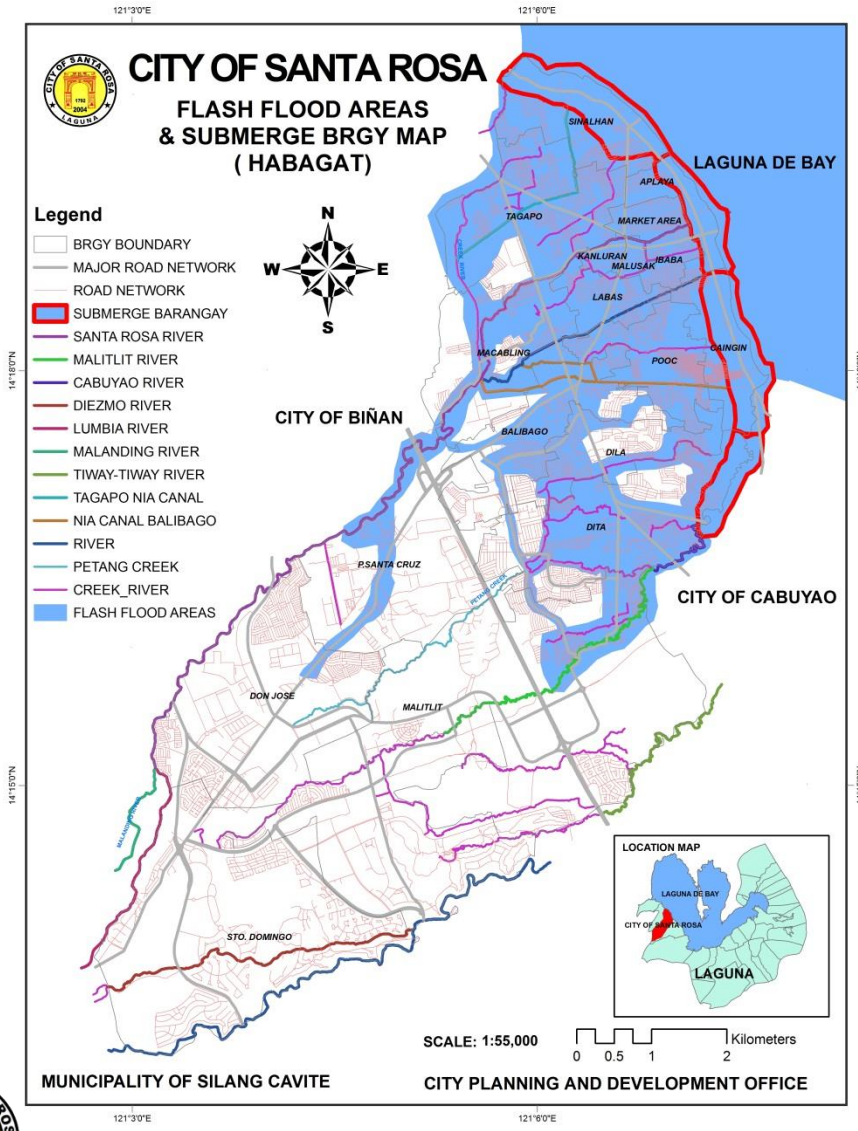
City of Santa Rosa - Fault line Map



City of Santa Rosa – Liquefaction Map

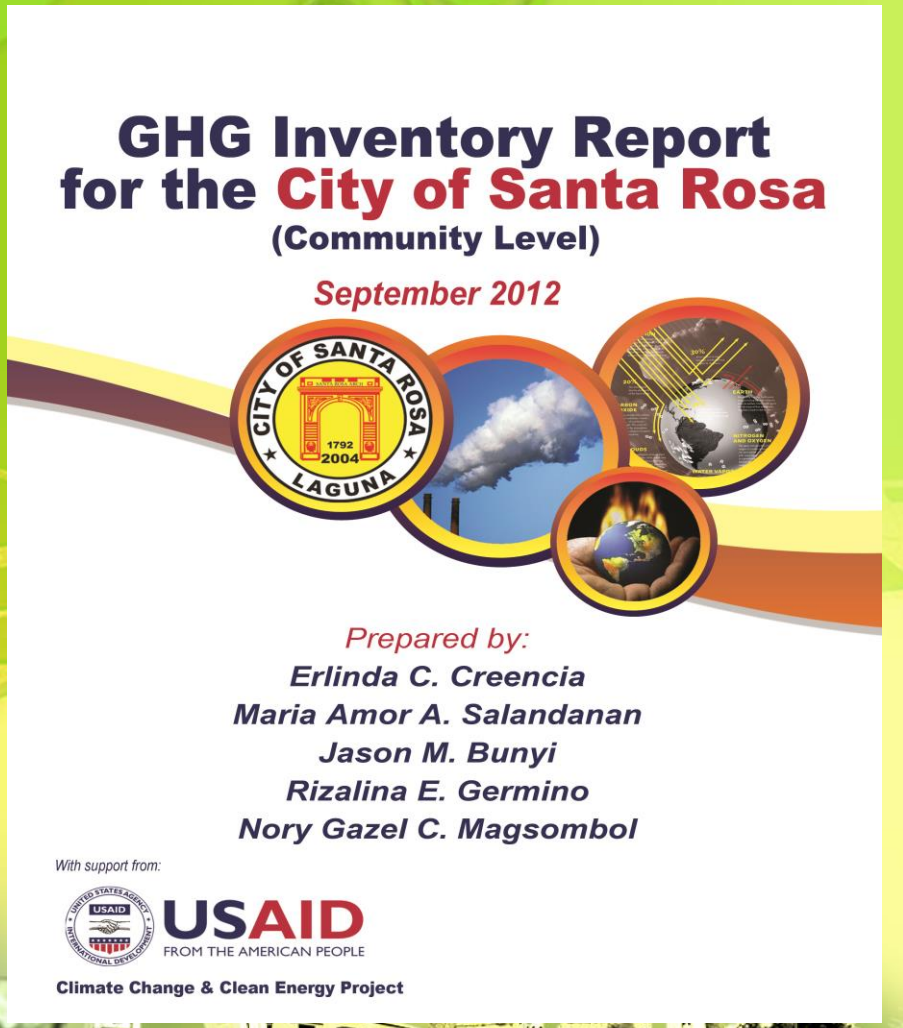


City of Santa Rosa – Flood Hazard Map



- Almost half of the land area of the city experience flashflood during the rainy seasons
- In the case of Typhoon Ondoy, wherein the water level in the lake was elevated, the coastal barangays experienced month-long flooding

CONDUCTED A GHG EMISSION INVENTORY



- **SEVERAL STUDIES CONDUCTED :**
  - **HYDROLOGY AND FLOOD ANALYSIS**
  - **FLOOD CONTROL AND DRAINAGE MASTER PLAN**

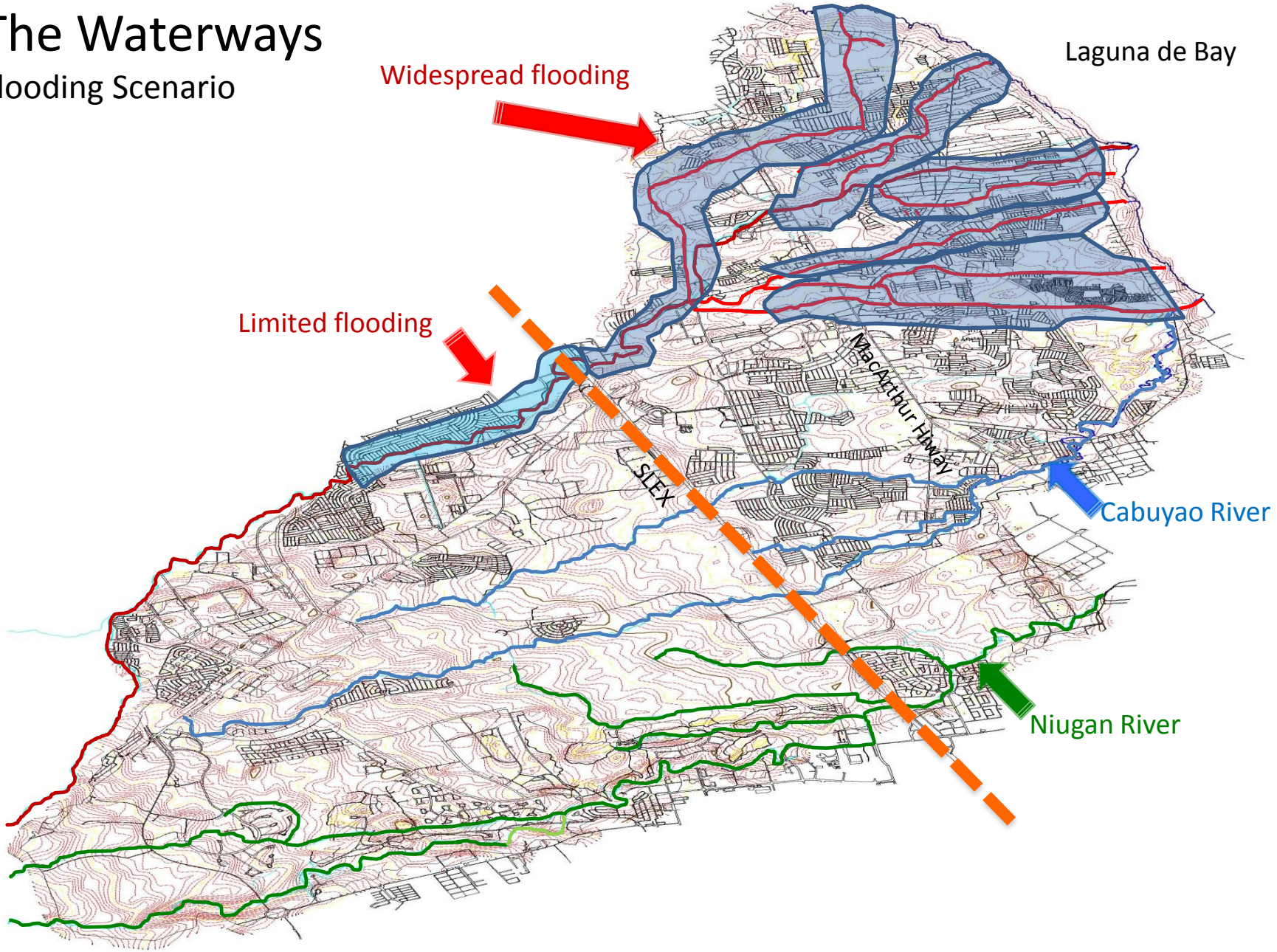
Table 1 Estimated Monthly Rainfall of the Sta. Rosa River Basin

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
1985	2.0	1.5	46.0	185.1	200.3	1362.9	499.0	468.3	376.1	647.8	139.6	112.4	4040.9
1986	6.8	21.8	1.3	10.2	108.7	179.5	402.5	1036.0	557.8	765.3	458.5	48.1	3596.4
1987	15.0	0.5	1.0	6.7	25.8	102.1	91.2	197.1	347.6	119.7	212.3	106.9	1225.8
1988	97.6	9.6	2.5	47.2	103.4	339.1	272.2	106.4	134.1	616.0	246.8	9.1	1984.1
1989	26.1	30.8	70.3	37.5	104.8	133.3	415.6	976.5	568.0	425.0	15.9	10.0	2814.0
1990	5.6	1.3	14.5	2.6	248.1	525.3	382.5	1051.3	223.4	251.1	299.5	85.9	3091.2
1991	7.2	6.7	76.1	9.8	70.1	129.1	398.0	972.2	303.4	63.6	160.7	50.2	2247.2
1992	2.1	4.3	5.1	44.6	180.4	101.7	494.7	648.6	221.7	292.9	187.9	62.3	2246.5
1993	32.0	0.4	2.0	6.8	5.9	282.7	455.9	362.0	158.6	233.0	184.1	321.8	2045.2
1994	15.8	0.6	2.6	36.3	93.9	270.5	878.5	182.7	283.0	249.6	50.3	56.8	2120.5
1995	6.5	32.7	0.0	1.9	290.5	606.6	283.4	194.3	530.9	387.4	291.0	198.5	2823.7
1996	9.4	2.8	15.3	94.7	63.8	195.0	949.4	133.9	289.8	208.0	480.2	52.9	2495.0
1997	3.0	24.2	2.7	21.4	584.7	280.4	608.2	506.1	188.7	49.0	48.7	15.4	2332.5
1998	37.9	0.2	2.7	31.1	229.9	232.4	184.9	228.7	647.6	910.9	402.4	1043.0	3951.8
1999	69.7	67.4	223.3	198.0	257.4	544.9	513.4	534.0	282.5	534.3	264.7	454.3	3943.9
2000	170.6	166.0	97.3	58.7	456.2	275.0	1041.4	291.3	287.6	358.7	226.6	122.8	3552.1
2001	25.9	85.3	14.5	17.3	179.5	264.4	304.6	285.1	56.5	208.8	179.2	82.5	1703.7
2002	2.0	6.6	6.0	3.6	53.4	175.3	761.9	173.6	188.9	131.6	82.3	39.3	1624.4
2003	11.8	0.5	2.9	9.4	385.5	128.8	255.5	225.0	218.3	53.4	114.2	38.3	1443.6
2004	13.0	21.0	11.2	12.9	98.9	310.6	242.9	397.6	70.4	65.9	236.7	49.9	1531.2
2005	15.5	8.8	10.4	33.8	80.0	125.6	147.2	327.4	297.2	276.6	106.1	270.3	1698.9
2006	97.4	15.7	34.8	4.1	181.7	211.0	301.8	204.7	431.5	55.8	128.0	201.9	1868.4
2007	23.3	8.4	21.7	3.9	105.2	72.6	144.8	417.0	226.8	157.8	334.7	141.0	1657.2
Mean	30.3	22.5	28.9	38.2	178.6	297.8	436.1	431.3	299.6	307.1	210.9	155.4	2436.4
Max.	170.6	166.0	223.3	198.0	584.7	1362.9	1041.4	1051.3	647.6	910.9	480.2	1043.0	4040.9
Min.	2.0	0.2	0.0	1.9	5.9	72.6	91.2	106.4	56.5	49.0	15.9	9.1	1225.8
StDv	41.3	38.1	50.3	53.4	143.0	273.0	260.0	303.8	157.7	242.4	125.9	222.6	877.5

Source: Sta. Rosa Watershed Hydrology and Hydrogeology Report by WWF

The Waterways

Flooding Scenario



Recent Flooding in the City

Year	Typhoon	No. of Affected Barangays
2008	Frank	4
2009	Nando	3
	Ondoy	8
	Santi	8
2010	Basyang	4
2011	Pedring	4
2012	Habagat	10
	Ofel	10

UPDATING THE COMPREHENSIVE LAND USE PLAN (CLUP)

2014-2028

PROPOSED POLICIES and STRATEGIES

WITH CLIMATE CHANGE MEASURES

- Regulation of future development in high risk areas for certain types of land use and physical structures.
- Designation of priority areas to improve urban micro-climate in heavily built-up areas such as the central business district/old town area
- Develop and strengthened building design standards
- Designation of areas for urban renewal/ redevelopment areas

- **Develop guidelines and incentives for green open space/ urban gardens/green roofs/vertical greenery**
- **Adoption and application of green technology in government and private sector buildings**
- **Formulate and implement a sustainable watershed development plan that will address flooding and protection of the water recharge areas through an integrated approach in coordination with the neighboring LGUs**

THANK YOU